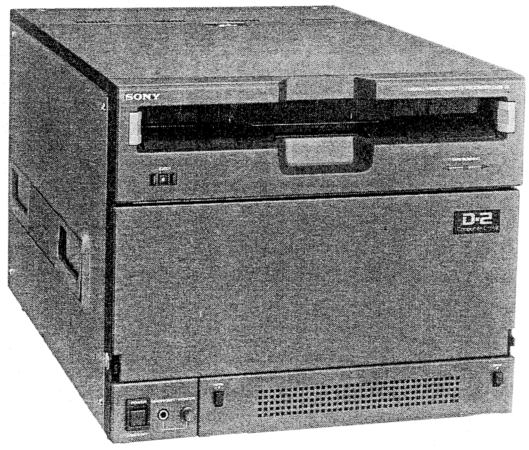
SONY®

DIGITAL VIDEOCASSETTE RECORDER

DVR-28P



D-2

Composite Digital

MAINTENANCE MANUAL

Volume 1 1st Edition (Revised 6)

Serial No.10001 and Higher

SAFETY CHECK-OUT

After correcting the original service problem, perform the following safety checks before releasing the set to the customer:

Check the metal trim, "metallized" knobs, screws, and all other exposed metal parts for AC leakage. Check leakage as described below.

LEAKAGE TEST

The AC leakage from any exposed metal part to earth ground and from all exposed metal parts to any exposed metal part having a return to chassis, must not exceed 3.5mA. Leakage current can be measured by any one of three methods.

1. A commercial leakage tester, such as the Simpson 229 or RCA WT-540A. Follow the manufacturers' instructions to use these instruments.
2. A battery-operated AC milliammeter. The Data Precision 245 digital multimeter is suitable for this job.
3. Measuring the voltage drop across a resistor by means of a VOM or battery-operated AC voltmeter. The "limit" indication is 5.25V so analog meters must have an accurate low-voltage scale. The Simpson 250 and Sanwa SH-63Trd are examples of a passive VOM that is suitable. Nearly all battery operated digital multimeters that have a 20V AC range are suitable. (See Fig. A)

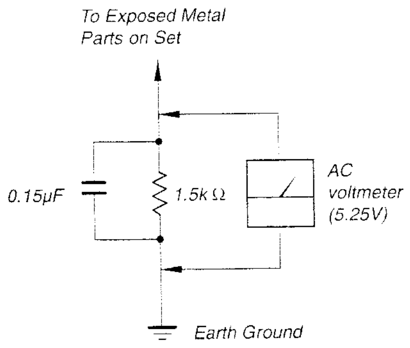


Fig. A. Using an AC voltmeter to check AC leakage.

このマニュアルに記載されている事柄の著作権は当社にあり、説明内容は機器購入者の使用を目的としています。
従って、当社の許可なしに無断で複写したり、説明内容(操作、保守等)と異なる目的で本マニュアルを使用することを禁止します。

The material contained in this manual consists of information that is the property of Sony Corporation and is intended solely for use by the purchasers of the equipment described in this manual.
Sony Corporation expressly prohibits the duplication of any portion of this manual or the use thereof for any purpose other than the operation or maintenance of the equipment described in this manual without the express written permission of Sony Corporation.

Le matériel contenu dans ce manuel consiste en informations qui sont la propriété de Sony Corporation et sont destinées exclusivement à l'usage des acquéreurs de l'équipement décrit dans ce manuel.
Sony Corporation interdit formellement la copie de quelque partie que ce soit de ce manuel ou son emploi pour tout autre but que des opérations ou entretiens de l'équipement à moins d'une permission écrite de Sony Corporation.

Das in dieser Anleitung enthaltene Material besteht aus Informationen, die Eigentum der Sony Corporation sind, und ausschließlich zum Gebrauch durch den Käufer der in dieser Anleitung beschriebenen Ausrüstung bestimmt sind.
Die Sony Corporation untersagt ausdrücklich die Vervielfältigung jeglicher Teile dieser Anleitung oder den Gebrauch derselben für irgendeinen anderen Zweck als die Bedienung oder Wartung der in dieser Anleitung beschriebenen Ausrüstung ohne ausdrückliche schriftliche Erlaubnis der Sony Corporation.

TABLE OF CONTENTS

Volume -1

1. INSTALLATION

1-1. Unpacking and Repacking 1-1
1-2. Supplied Accessories and Optional Accessories 1-2
  1-2-1. Supplied Accessories 1-2
  1-2-2. Optional Accessories 1-3
1-3. Power Requirement 1-3
  1-3-1. Capacity of AC Power Source 1-3
  1-3-2. Power Cable Coding 1-3
  1-3-3. Ventilation/Heat Sink 1-4
1-4. Installation Conditions 1-4
1-5. Installation Space 1-5
1-6. Using the Extension Board, EX-341/341 (A) 1-8
1-7. Installing the Function Control Panel 1-8
  1-7-1. Blank Panel Removal 1-8
  1-7-2. Installing the Function Control Panel 1-9
1-8. Input/Output Interface 1-12
  1-8-1. Matching Connectors and Cables 1-12
  1-8-2. Signal Inputs and Outputs 1-13
1-9. Switch/Jumper/Indicator/Adjustment Settings 1-21
1-10. Rack-Mounting 1-36

2. SERVICE INFORMATION

2-1. Specifications 2-1
2-2. Printed Circuit Board Function 2-7
2-3. Main Parts Location 2-12
  2-3-1. Tape Transport ① 2-12
  2-3-2. Tape Transport ② 2-13
  2-3-3. Tape Transport ③ 2-14
  2-3-4. Chassis 2-15
  2-3-5. Cassette Compartment 2-18
  2-3-6. Power Supply 2-18
  2-3-7. Function Control Panels, BKDV-200/201/202 (Option) 2-19
2-4. Removal of Cabinets 2-20
2-5. Notes on Power Unit 2-22
  2-5-1. Primary Circuit & Electric Shock 2-22
  2-5-2. Notes on Voltage Selector 2-22
  2-5-3. Removal of Power Supply 2-23
  2-5-4. Power Supply Adjustment 2-24
  2-5-5. Removal of FU-53/PS-256/RE-52/CT-133 boards 2-25
  2-5-6. Extension Cable for the SW-REG Adjustment 2-26
2-6. Removing/Inserting Plug-in Boards 2-27
2-7. Notes on Repair Parts 2-28
  2-7-1. Notes on Repair Parts 2-28
  2-7-2. Replacement Procedure of Chip Parts 2-28
  2-7-3. Replacing Backup Battery 2-29
  2-7-4. Replacing Flexible Card Wire 2-30
2-8. Notes on Replacing Boards 2-30
2-9. How to Remove a Cassette When the Tape is Slack 2-31
2-10. Cleaning Procedures for Head Clogging 2-33
2-11. Connecting the Cable to the Digital Video In/Out Connectors 2-35
2-12. Setting the User Set Value for Sync Phase and SC Phase 2-36
2-13. BKDV-103/105/106, BKDV-110/111 2-39
2-14. Monitor Select Keys Operation 3-40

3. TEST MENU

For BKDV-101

3-1. Outline 3-1
3-2. OP Time Menu 3-2
3-3. RF Menu 3-3
  3-3-1. RF Menu Key Function Directories 3-3
  3-3-2. RF Menu 3-4
  3-3-3. RF ADJ Menu 3-7
  3-3-4. ADJUST-REC Menu 3-9
  3-3-5. REC TEST Menu 3-11
  3-3-6. Message Flowchart 3-12
3-4. PROC Menu 3-13
3-5. Multi-loop Test 3-14
  3-5-1. When Adjusting without Recording on the Tape Using INT SG as the Reference Signal 3-15
  3-5-2. When Adjusting While Recording on the Tape Using INT SG as the Reference Signal 3-16
  3-5-3. When Adjusting without Recording on the Tape Using Signals Recorded on the Tape 3-17
  3-5-4. When Adjusting While Recording on the Tape Using Signals Recorded on the Tape 3-18
3-6. Checker Menu 3-19
  3-6-1. Keys' Description 3-20
  3-6-2. List of Commands 3-20
  3-6-3. Example of Command Usage 3-21
  3-6-4. SP Test Mode Menu 3-24
  3-6-5. SV Test Mode Menu 3-62
  3-6-6. UC Test Mode Menu 3-119
  3-6-7. Checker Menu Flowchart 3-131
  3-6-8. Countermeasures for Error Messages 3-133

For BKDV-200/201

3-1. Outline 3-149
3-2. OP Time Menu 3-151
3-3. RF Menu 3-152
  3-3-1. RF ENVELOPE Menu 3-152
  3-3-2. RF PB ADJUST Menu 3-153
  3-3-3. RF REC ADJUST Menu 1-156
3-4. PROC Menu 3-159
3-5. Multi-loop Test 3-160
  3-5-1. When Adjusting without Recording on the Tape Using INT SG as the Reference Signal 3-161
  3-5-2. When Adjusting While Recording on the Tape Using INT SG as the Reference Signal 3-162
  3-5-3. When Adjusting without Recording on the Tape Using Signals Recorded on the Tape 3-163
  3-5-4. When Adjusting While Recording on the Tape Using Signals Recorded on the Tape 6-164
3-6. Checker Menu 3-165
  3-6-1. Key's Description 3-166
  3-6-2. List of Commands 3-168
  3-6-3. Example of Command Usage 3-169

NOTE:
For Section 3-6-4 to 3-6-8, refer to FOR BKDV-101 Checker Menu.

4. TOOLS AND MEASURING INSTRUMENTS

4-1. Tools 4-1
  4-1-1. How to Use Tool 4-1
  4-1-2. Tool Kit 4-2
  4-1-3. Tools 4-4
4-2. Measuring Instruments 4-14
4-3. Alignment Tape 4-15

5. PERIODIC CHECK AND MAINTENANCE

5-1. Periodic Check Item 5-1
5-2. Cleaning 5-5
  5-2-1. Upper Drum's Tape Running Path and Rotary Head 5-7
  5-2-2. Lower Drum's Tape Running Path and Laed Surface 5-9
  5-2-3. Tape Running System 5-10
  5-2-4. Full Erase Head and Tape Cleaner 5-11
  5-2-5. Slider Rail 5-12
  5-2-6. Reel Table 5-13
  5-2-7. DC Fan Motor 5-14
  5-2-8. Cassette Compartment 5-15
5-3. Tracking Check 5-16
5-4. Head Projection Check 5-18
  5-4-1. Inner Drum Eccentricity Adjustment Tool 5-18
  5-4-2. Head Projection Check 5-19
5-5. Grease Smearing and Lubrication 5-21

6. PART REPLACEMENT

6-(1). General Information for Part Replacement 6-1 (1)
  6-(1)-1. Preparation before Part Replacement 6-1 (1)
  6-(1)-2. Use of Tool 6-1 (1)
  6-(1)-3. How to Enter Threading End/Unthreading End State by Manual Operation 6-2 (1)
  6-(1)-4. Monitor Select Key Operation 6-3 (1)
6-1. Inner Drum Ass'y Replacement 6-1
  6-1-1. Inner Drum Ass'y Replacement 6-1
  6-1-2. Inner Drum Eccentricity Adjustment 6-10
6-2. Drum Ass'y Replacement 6-13
6-3. Brush Slip Ring Ass'y Replacement 6-19
6-4. Cleaning Roller Ass'y Replacement 6-21
6-5. Cassette Compartment Ass'y Replacement 6-25
6-6. Cassette Compartment Component Replacement 6-39
  6-6-1. Cassette Compartment Component Replacement (1) 6-40
  6-6-2. Cassette Compartment Component Replacement (2) 6-44
  6-6-3. Adjustment During Cassette Compartment Component Replacement 6-51
6-7. Reel Table Block Component Replacement 6-55
  6-7-1. Reel Table Ass'y Replacement 6-58
  6-7-2. Reel Brake Ass'y Replacement 6-64
  6-7-3. Reel Motor Replacement 6-67
  6-7-4. Timing Belt Replacement 6-71
  6-7-5. Motor Frame Limiter Block Replacement 6-79
  6-7-6. Motor Frame Ass'y Replacement 6-82
6-8. Reel Table Drive Block Component Replacement 6-89
  6-8-1. Reel Table Shift Motor Ass'y Replacement 6-90
  6-8-2. Sub-Pulley Ass'y Replacement (at timing belt driven side) 6-97
  6-8-3. Pulley Ass'y Replacement (at timing belt driven side) 6-101
  6-8-4. Reel Table M Stopper Ass'y Replacement 6-107
  6-8-5. Reel Shift Potentiometer Ass'y Replacement 6-110
6-9. S Tension Regulator Ass'y Components Replacement 6-121
  6-9-1. S4 Guide Ass'y Replacement 6-122
  6-9-2. S Tension Regulator Ass'y Replacement 6-125
  6-9-3. S Side Tape Tension Adjustment 6-133
6-10. Replacement of S Guide Base Ass'y Component Parts 6-141
  6-10-1. S5 Guide Ass'y Replacement 6-142
  6-10-2. S6 Guide Ass'y Replacement 6-143
6-11. Replacement of T Tension Regulator Ass'y 6-147
  6-11-1. T Tension Regulator Ass'y Replacement 6-148
  6-11-2. T6 Guide Replacement 6-150
  6-11-3. Air Damper Replacement 6-153
  6-11-4. T Side Tape Tension Adjustment 6-155
6-12. T Guide Base Ass'y Components Replacement 6-163
  6-12-1. T Guide Base Replacement 6-164
  6-12-2. T7 Guide Ass'y Replacement 6-167
6-13. Slider (S) Ass'y Replacement 6-171
  6-13-1. Slider (S) Ass'y Replacement 6-172
  6-13-2. S1 Guide Ass'y Replacement 6-175
  6-13-3. S2 Guide Ass'y Replacement 6-178
  6-13-4. UD-4 Board Replacement 6-180
6-14. Slider (T) Ass'y Replacement 6-183
  6-14-1. Slider (T) Ass'y Replacement 6-184
  6-14-2. T1 Guide Ass'y Replacement 6-187
  6-14-3. T2 Guide Ass'y Replacement 6-190
  6-14-4. UD-5 Board Replacement 6-192
6-15. LD Rail Ass'y Component Replacement 6-195
  6-15-1. V Plate (S) / (T) Ass'y Replacement 6-195
  6-15-2. LD Rail Replacement 6-198
6-16. Loading Motor Ass'y Replacement 6-211
6-17. M Gear Box Ass'y Replacement 6-215
  6-17-1. Drum Base Block Removal/Installation 6-216
  6-17-2. M Gear Box Ass'y Replacement 6-222
  6-17-3. Potentiometer Position Adjustment 6-228
6-18. S Gear Box Ass'y Replacement 6-233
6-19. Main Shaft Ass'y Replacement 6-237
6-20. Loading Gear Ass'y Replacement 6-253
6-21. S Load Arm Ass'y Replacement 6-261
6-22. T Load Arm Ass'y Replacement 6-267
6-23. T Drawer Arm Ass'y Replacement 6-275
  6-23-1. Pinch Roller Ass'y Replacement 6-276
  6-23-2. T5 Guide Ass'y Replacement 6-278
  6-23-3. Pinch Arm Ass'y and Return Link Ass'y Replacement 6-282
  6-23-4. T Arm Ass'y Replacement 6-285
6-24. Stationary Head Ass'y Replacement 6-289
  6-24-1. Stationary R/P Head Replacement 6-290
  6-24-2. Confidence Head Replacement 6-296
  6-24-3. T3 Guide Ass'y Replacement 6-300
6-25. FE/TC Ass'y Replacement 6-303
  6-25-1. Full Erase Head Replacement 6-303
  6-25-2. S3 Guide Ass'y Replacement 6-306
  6-25-3. Tape Cleaner Block Component Replacement 6-309
6-26. Pinch Roller Press Block Replacement 6-319
  6-26-1. Pinch Roller Press Link Ass'y Components Replacement 6-320
  6-26-2. Pinch Roller Solenoid Ass'y Replacement 6-334

6-26-3. Pinch Roller Sub-Solenoid Replacement..............6-337
6-27. Capstan Motor Replacement 6-339

7. GENERAL INFORMATION FOR ALIGNMENT

7-1. Index of Alignment 7-1
7-2. Equipment Required..7-2
7-3. Way of Describing Electric Alignment Parts Notation 7-4
7-4. External Test Signals (When using signal Generator)..................................7-4
7-5. Internal Test Signals 7-5
7-6. How to Access Menu 7-6

8. POWER SUPPLY ALIGNMENT

8-1. Alignment Preparation 8-1
8-2. +5 V Voltage Alignment (RE-52 Board)..................8-3
8-3. Series Regulator Voltage Alignment (RE-52 Board)..8-4
8-4. Series Regulator Current Limiter Alignment (RE-52 Board)..8-4
8-5. +22 V Voltage Alignment (CT-133 Board)..............8-5
8-6. Voltage Selector Protection Threshold Alignment (CT-133 Board) 8-6
8-7. Motor Drive Output Voltage Alignment (RE-52 Board)..8-6

9. TAPE TRANSPORT SYSTEM ALIGNMENT

1. Tape Path System Alignment 9-1
2. Cautions in the Tape Path System Alignment 9-1
9-1. Outline...9-10
9-2. Flowchart for Tape Path System Alignment (Detailed Description)...9-11
9-3. Tape Path Adjustment/Tracking Adjustment 9-14
  9-3-1. Preliminary Information 9-14
  9-3-2. Procedure 1. S-Side, Tape Path/Tracking Adjustment..9-14
  9-3-3. Procedure 2. T-Side Tracking Adjustment.........9-26
  9-3-4. Procedure 3. T-Side Tape Path Adjustment........9-46
APPENDIX 1. Flowchart for Tape Path Alignment.............9-49
APPENDIX 2. Tape Path Check Quick Reference................9-50
APPENDIX 3. S1/S2/T1/T2 Guide Adjustment Quick Reference...9-52
APPENDIX 4. Simplified Check for Tracking......................9-54
APPENDIX 5. How to Use Cleaning Cassette Tape and Head Clogging Check Method and Measure..9-56
APPENDIX 6. S and T Reel Tables Height Adjustment......9-59
APPENDIX 7. Monitor Select Key Operation 9-60

10. SERVO SYSTEM ALIGNMENT

10-1. Alignment Sequence..10-1
10-2. Alignment Preparation 10-3
10-3. Servo Automatic Alignment.......................................10-6
10-4. Drum Motor Alignment...10-8
10-5. Capstan Motor Alignment...10-12
10-6. Supply Reel Motor Alignment 10-15
10-7. Take-up Reel Motor Alignment 10-17
10-8. Tape Sensor Alignment 10-19
10-9. Drum PG, FG Waveform Check 10-21
10-10. USG Alignment...10-21
10-11. Tape Tension Alignment..10-23
10-12. Servo Self Diagnostics 10-24

11. CUE, TC, CTL SIGNAL SYSTEM ALIGNMENT

11-1. Alignment Sequence (AE-15/ED-24 Board)..............11-1
11-2. Alignment Preparation 11-1
11-3. CUE REC Preset Level Alignment (AE-15 Board)..11-3
11-4. CUE/TC Line Amplifier Output Level Alignment (AE-15 Board)..11-3
11-5. CUE Level Meter Calibration (AE-15 Board) 11-3
11-6. CUE PB Level Alignment (AE-15 Board)...............11-4
11-7. CUE PB Frequency Response Alignment (AE-15 Board)..11-4
11-8. Erase Current Alignment (AE-15 Board)...................11-5
11-9. Bias Current Alignment (AE-15 Board) 11-7
11-10. CUE REC Level Alignment (AE-15 Board)............11-8
11-11. CUE REC Amplifier Frequency Response Alignment (AE-15 Board)..11-8
11-12. TC and CTL REC Level Alignment (AE-15 Board)..11-9
11-13. TC and CTL REC Level Alignment (three times tape speed) (AE-15 Board).....................11-10
11-14. TC-CTL Crosstalk Alignment (AE-15 Board)..........11-10
11-15. TC, CTL CONFI Level Alignment (ED-24 Board)..11-11

12. DT SYSTEM ALIGNMENT

12-1. Alignment Sequence (MD-50/DD-11/DT-16 Board) 12-1
12-2. Alignment Preparation 12-1
12-3. DT Driver Voltage Alignment (MD-50 Board: For DVR-20P/C20P) (DD-11 Board: For DVR-28P)..................................12-3
12-4. A/D Converter Reference Voltage Alignment (DT-16 Board) 12-3
12-5. Head A and B Loop Gain Alignment (DT-16 Board) 12-4
12-6. Head C and D Loop Gain Alignment (DT-16 Board) 12-5
12-7. Head A and B Drive Gain Alignment (DT-16 Board) 12-6
12-8. Head C and D Drive Gain Alignment (DT-16 Board) 12-7

13. RF SIGNAL SYSTEM ALIGNMENT

13-1. Alignment Procedure 13-1
13-2. Alignment Preparation 13-3
13-3. REC Current Secondary Distortion Alignment (REC-11P Board) 13-5
13-4. REC Current Frequency Response Alignment (1) (REC-11P Board) 13-7
13-5. PB Equalizer Alignment (EQ-29 Board) 13-9
13-6. REC Current Alignment 13-11
  13-6-1. CH-A and CH-C REC Current Alignment 13-12
  13-6-2. CH-B and CH-D REC Current Alignment 13-13
  13-6-3. Saving the Control Data 13-14
13-7. SELF Recording/Playback Error Rate Confirmation 13-14
13-8. REC Current Frequency Response Alignment (2) 13-15
13-9. RF Envelope Offset Alignment (EQ-29 Board) 13-16
13-10. PLL Alignment (EQ-29 Board) 13-17
13-11. REC Head Playback Envelope Gain Alignment (REC-11P Board) 13-19
13-12. Flying Erase Head Check (EQ-29 board) 13-20

14. VIDEO SIGNAL SYSTEM ALIGNMENT

14-1. Alignment Sequence 14-1
14-2. Alignment Preparation 14-1
14-3. Video Output Offset Level Alignment (VM-05 Board) 14-5
14-4. Video Output Level Alignment (VM-05 Board) 14-5
14-5. Video Output Frequency Response Alignment (VM-05 Board) 14-6
14-6. Burst Level Alignment (PR-163 Board) 14-7
14-7. V Reset Pulse Width Alignment (PR-163 Board) 14-8
14-8. PAL H Modulation Width Alignment (PR-163 Board) 14-9
14-9. CF Control Alignment (1) (PR-163 Board) 14-10
14-10. CF Error Detection Alignment (PR-163 Board) 14-11
14-11. CF Control Alignment (2) (PR-163 Board) 14-12
14-12. SC Phase Alignment (PR-163 Board) 14-13
14-13. Video A/D Convertor Reference Voltage Alignment (AD-73 Board) 14-14
14-14. Burst Tuning Alignment (AD-73 Board) 14-14
14-15. Video Input Offset Level Alignment (AD-73 Board) 14-15
14-16. Video Input Level Alignment (AD-73 Board) 14-15
14-17. Video A/D Converter Matching Alignment (AD-73 Board) 14-15
14-18. Video Sampling Phase Alignment (AD-73 Board) 14-16
14-19. CF Error Detection Alignment (AD-73 Board) 14-17
14-20. Input Video Signal SC-H Phase Alignment (AD-73 Board) 14-18
14-21. Input Video Signal Color Framing Alignment (AD-73 Board) 14-19
14-22. Internal Frequency Alignment (AD-73 Board) 14-19
14-23. Multi-Looptest Using Alignment (AD-73 Board) 14-20

15. AUDIO SIGNAL SYSTEM ALIGNMENT

15-1. Alignment sequence 15-1
15-2. Alignment Preparation 15-1
15-3. Line Amplifier Output Alignment (LO-14 Board) 15-5
15-4. Audio Gain Control Circuit Unity Level Alignment (AD-73 Board) 15-5
15-5. Audio A/D Convertor Input Level Alignment (AD-73 Board) 15-5
15-6. Audio Levelmeter Alignment (AD-73 board) 15-6
15-7. Audio Gain Control Circuit Balance Alignment (AD-73 Board) 15-6
15-8. Audio Input Circuit CMRR Alignment (AD-73 Board) 15-7
15-9. Audio Gain Control Circuit Max Level Alignment 15-7

16. THEORY OF OPERATION

(Section 16 will be available as a Supplement.)

Volume-2

17. BLOCK DIAGRAMS

18. SCHEMATIC DIAGRAMS

19. BOARD LAYOUTS

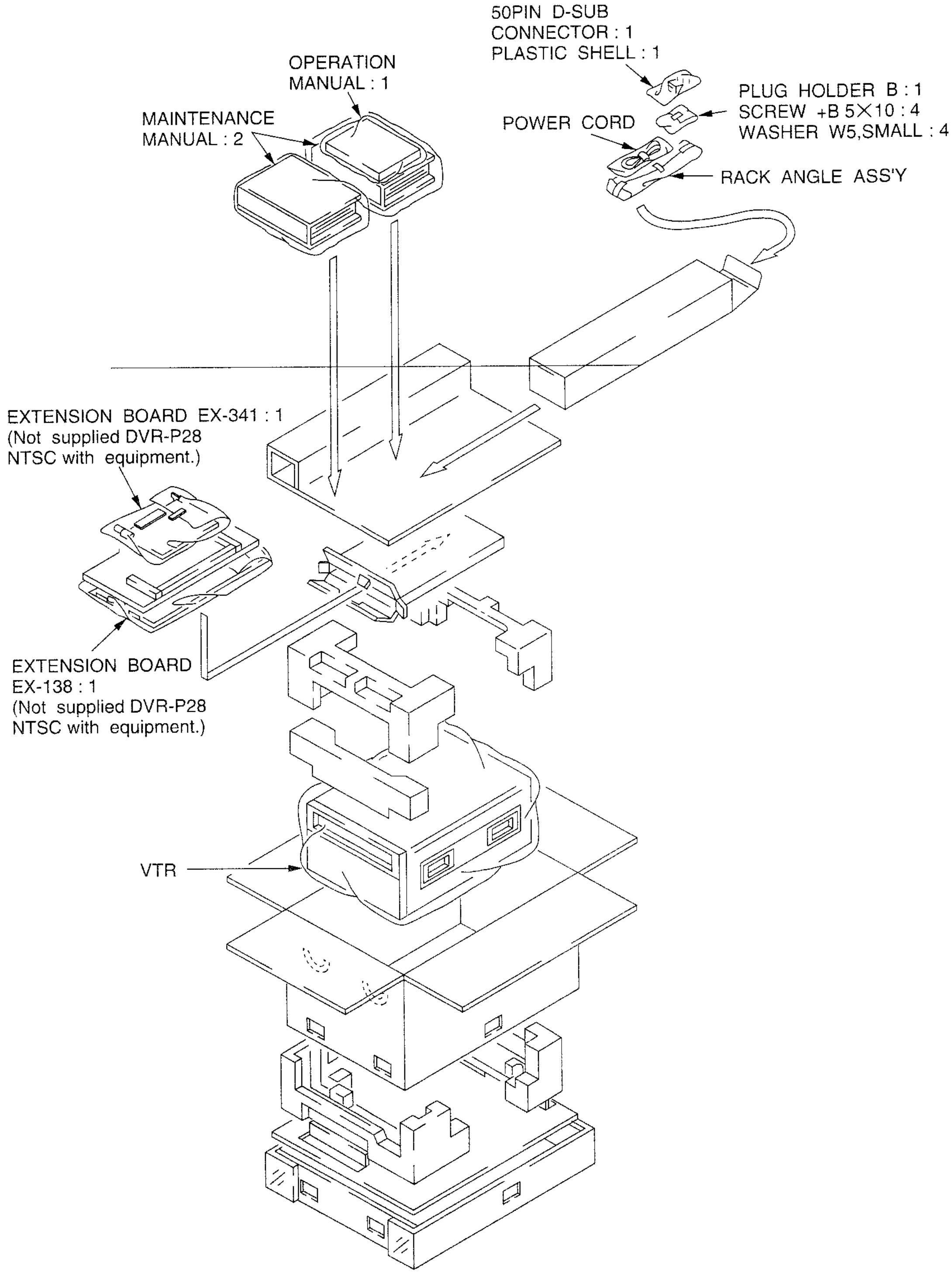
20. SEMICONDUCTOR PIN ASSIGNMENTS

21. SPARE PARTS

22. CHANGED PARTS

SECTION 1
INSTALLATION

1-1. UNPACKING AND REPACKING


50PIN D-SUB
CONNECTOR : 1
PLASTIC SHELL : 1
OPERATION
MANUAL : 1
PLUG HOLDER B : 1
SCREW +B 5X10 : 4
WASHER W5,SMALL : 4
MAINTENANCE
MANUAL : 2
POWER CORD
RACK ANGLE ASS'Y
EXTENSION BOARD EX-341 : 1
(Not supplied DVR-P28
NTSC with equipment.)
EXTENSION BOARD
EX-138 : 1
(Not supplied DVR-P28
NTSC with equipment.)
VTR

1-2. SUPPLIED ACCESSORIES AND OPTIONAL ACCESSORIES

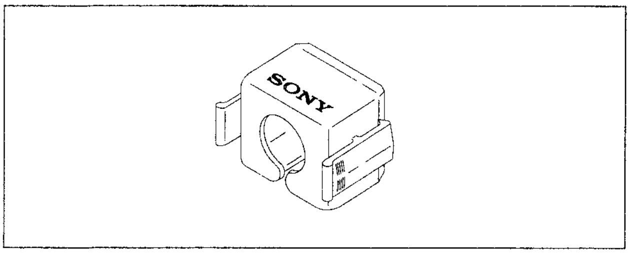
1-2-1. Supplied Accessories

Right Rack Angle Ass'y (8U) : 1
Left Rack Angle Ass'y (8U) : 1
Used for mounting DVR-20 in the rack.

Screw (B5x10) : 4
Washer (W5, SMALL) : 4
Used for mounting DVR-20 in the rack.

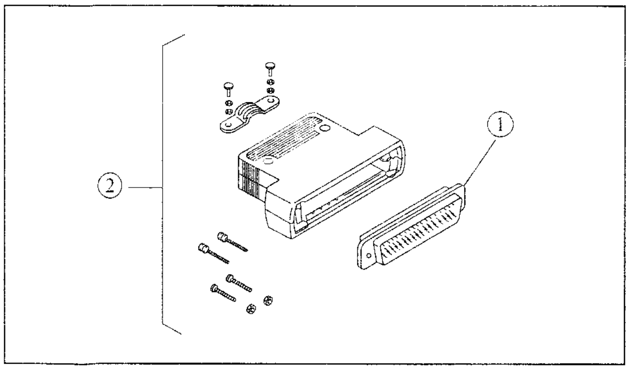
Power Cord: 1

Plug Holder B: 1
Used to secure the power input connector.



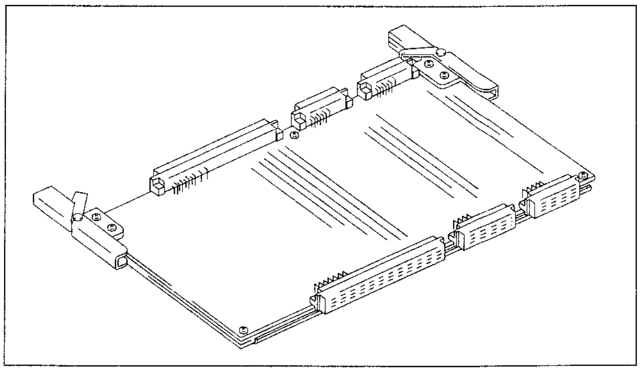
50 pin D-sub Connector (Male) : 1
This is the plug for the PARALLEL I/O connector used for connecting the parallel type remote controller to DVR-20.
It consists of:

① 50 pin D-sub connector (Male): 1
② Plastic Shell: 1

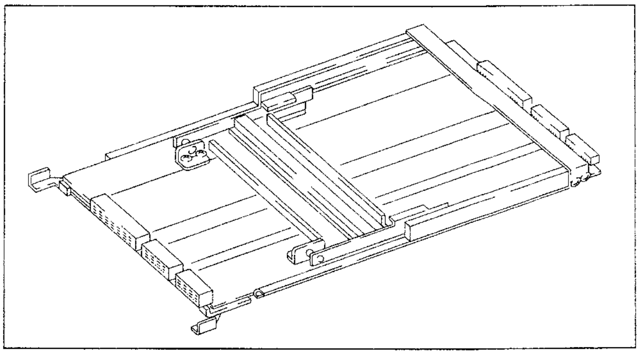


Extension Board: EX-185: 1
EX-341 (A): 1
(Not suppplied DVR-P28 NTSC with equipment)

EX-185 board is used for checking or repairing the following circuit boards.
AE-15, DT-16, EQ-29 boards



EX-341 (A) board is used for checking or repairing the following circuit boards.
AD-73 (DVR-28) /90 (DVR-P28 NTSC), DE-37/36, EN-99, MD-50, PR-157/163 and SSP-07 boards



Operation Manual: 1
Maintenance Manual: 2
VOL-1 and VOL-2 are provided with the unit..

1-2-2. Optional Accessories

Control Panel: BKDV-202
Control Panel: BKDV-201
Control Panel: BKDV-200
Control Panel: BKDV-101
Remote Control Adaptor (for BKDV-202/201/200/101)
: BKDV-102
Serial Interface Board: BKDV-105/103
Video Controller: BKDV-108
PROGRAM PLAY: BKDV-110 (For DVR-28)
BKDV-111 (For DVR-28P)
Rack Mount Rail: RMM-18DV
Sony Digital Video Cassette S, M, L Type: D2S/D2M/D2L
Cleaning Cassette: DCS-12CL or DCM-12CL
Digital Video Cable (D-sub 25-pin) : VCD-2D/5D/10D/30D
Digital Audio Cable (XLR 3-pin) : ECD-3C/10C/30C
Remote Control Cable (D-sub 9-pin) : RCC-5G/10G/30G
IEEE-488 Cable (24-pin) : SMK-0032

1-3. POWER REQUIREMENT

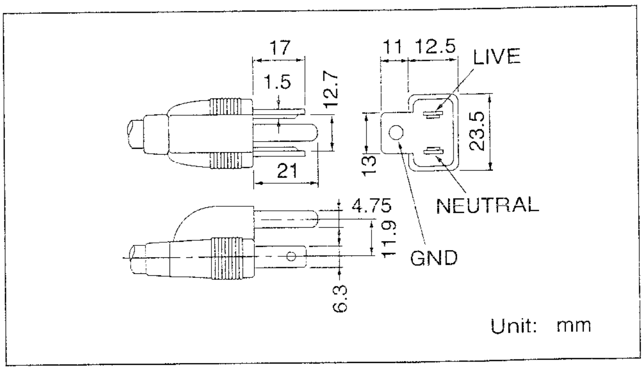
1-3-1. Capacity of AC Power Source

Power Line Voltage:	100 to 120 V ± 10%
Power Line Frequency:	50/60 Hz
Power Consumption:	DVR-28, DVR-28P (UC)
	800 VA
	DVR-28P (EK)
	950 VA
	DVR-P28 (NTSC)
	620 VA

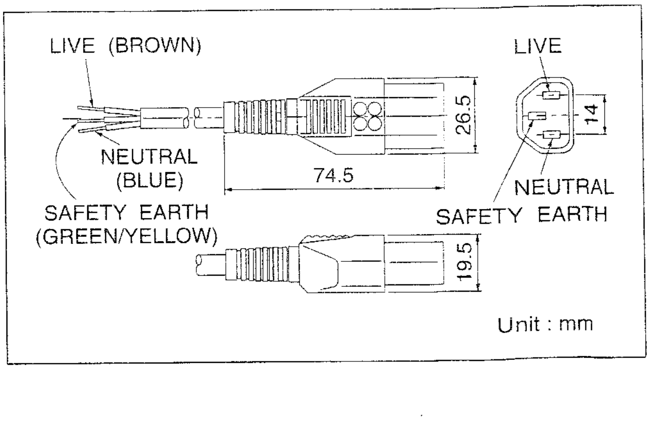
Note: When the unit is first powered ON, a maximum surge current of 20A will flow. The AC supply must therefore be capable of supplying this surge current, otherwise the power supply breaker on the supply side of the AC power supply may trip, or the unit may fail to function normally.

1-3-2. Power Cable Coding

Approx. 2.4m in length
For DVR-28


17
1.5
12.7
21
11 12.5
LIVE
23.5
13
NEUTRAL
4.75
11.9
6.3
GND
Unit: mm

For DVR-28P


LIVE (BROWN)
NEUTRAL
(BLUE)
SAFETY EARTH
(GREEN/YELLOW)
26.5
74.5
19.5
LIVE
14
NEUTRAL
SAFETY EARTH
Unit : mm

1-3-3. Ventilation/Heat Sink

Two cooling fans are fitted. If either the intake or exhaust becomes clogged or the fans stop, damage may result to the power unit etc.

The heat sinks provided on each board are rated on the assumption that cooling will be provided by the fans. Consequently, the unit should not be operated too long without fan cooling (such as when the unit is opened for checks etc.).

1-4. INSTALLATION CONDITIONS

Operating Temperature:	+5°C to +40°C
Storage Temperature:	−20°C to +60°C
Humidity:	10% to 90 % (no condensation)

Install the VTR on a flat stable base horizontally, or in the specified position.

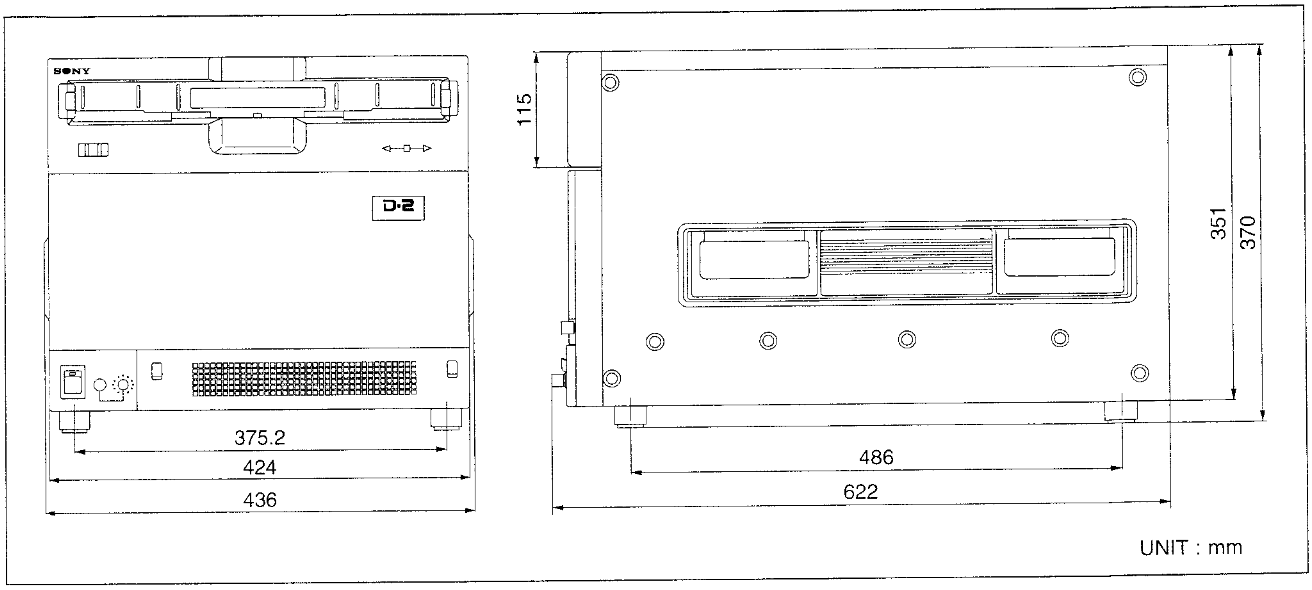
The weight of the VTR is about 60 kg after the blank panel has been removed and the function control panel (BKDV-201, BKDV-200 or BKDV-101) installed.

Do not install the unit in the following locations:

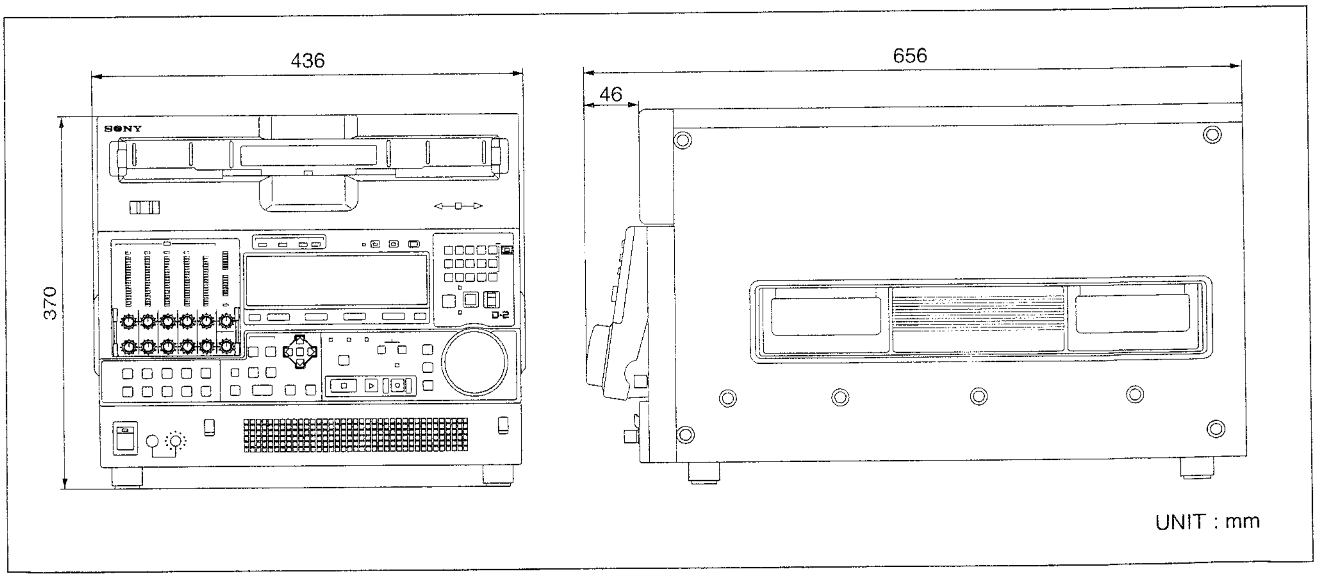
* Exposed to direct sunlight or powerful lighting
* In a dusty location
* In a location which is subjected to vibration
* In a powerful electric or magnetic field
* In a location which is subjected to static electricity noise

1-5. INSTALLATION SPACE

(1) External Dimensions

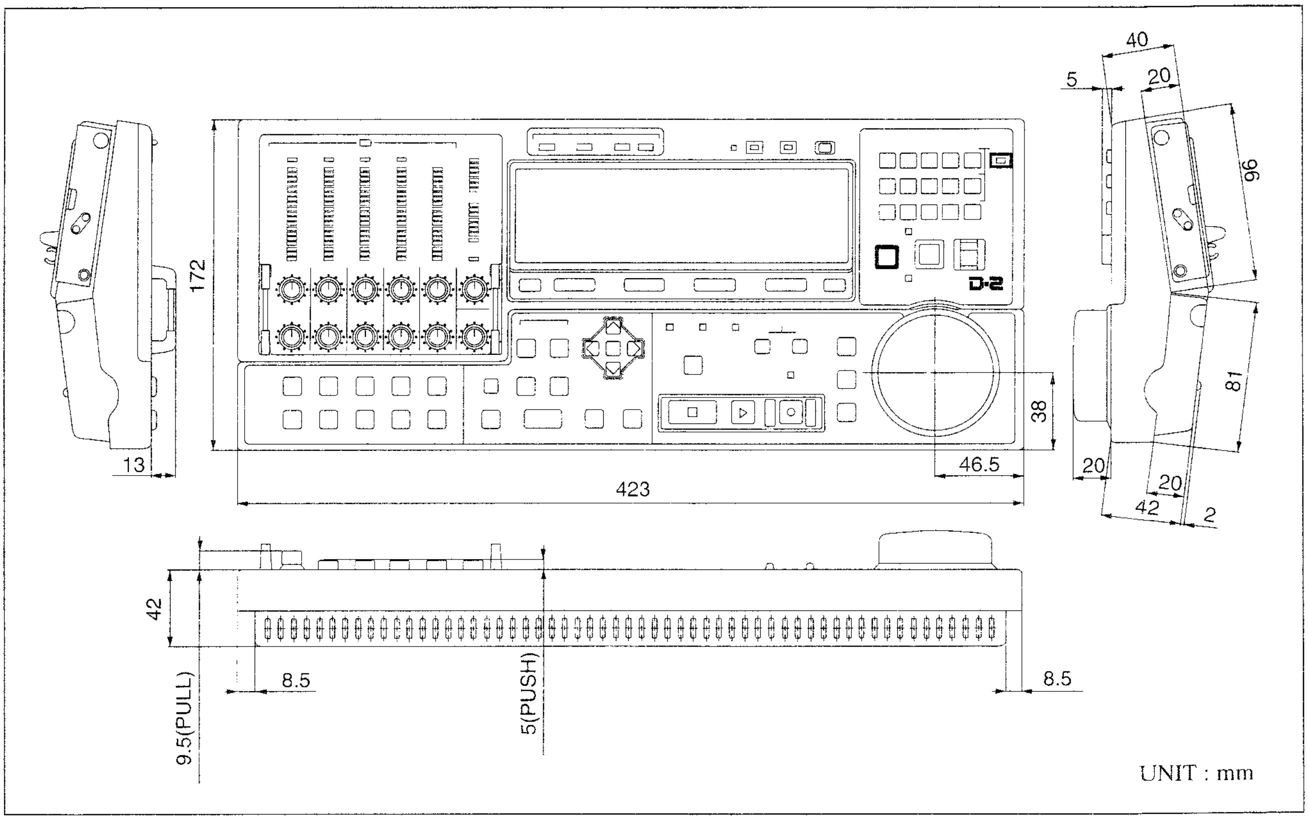

SONY
D-2
115
351
370
375.2
424
436
486
622
UNIT : mm

(2) When installing the function control panel
For BKDV-200/201/202/101
(This illustration is BKDV-201.)

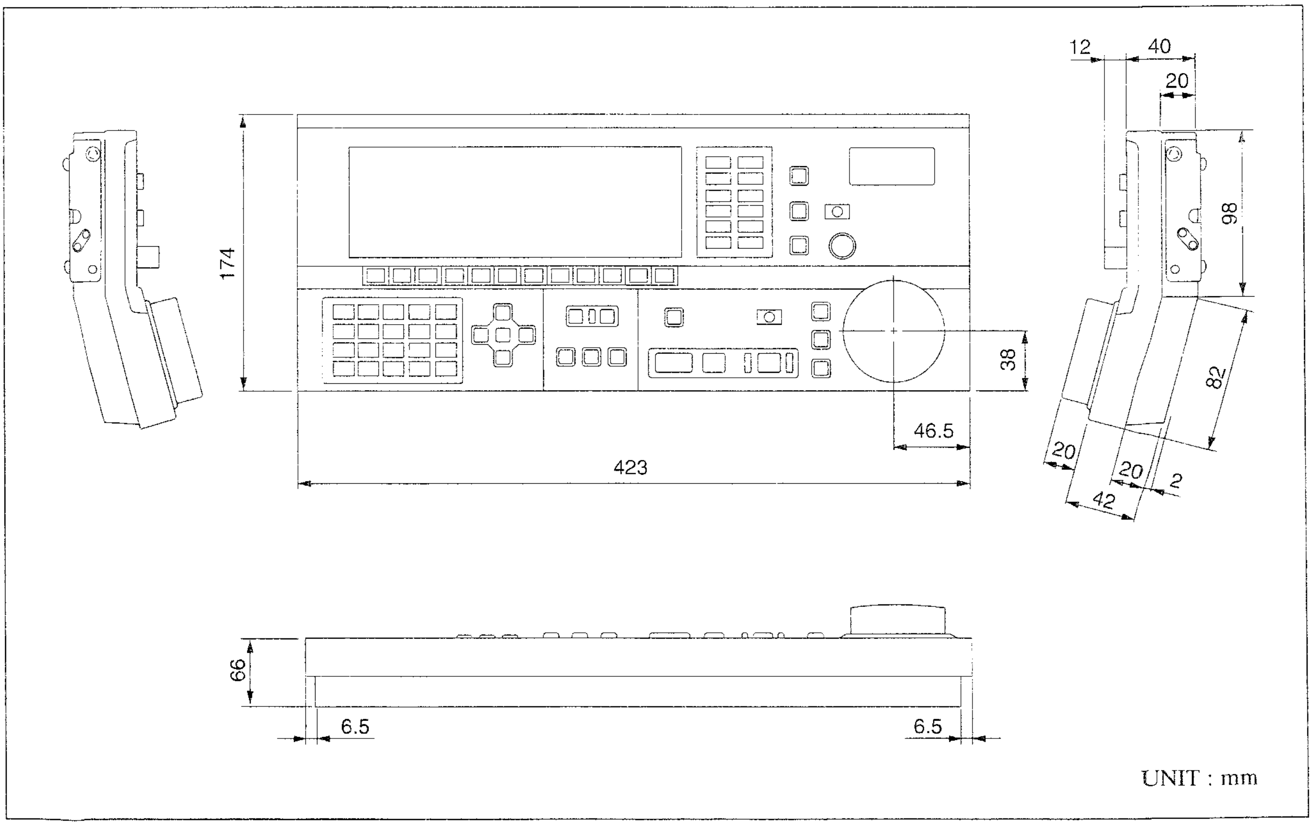

436
656
46
SONY
D-2
370
UNIT : mm

(3) Function Control Panel (Option)

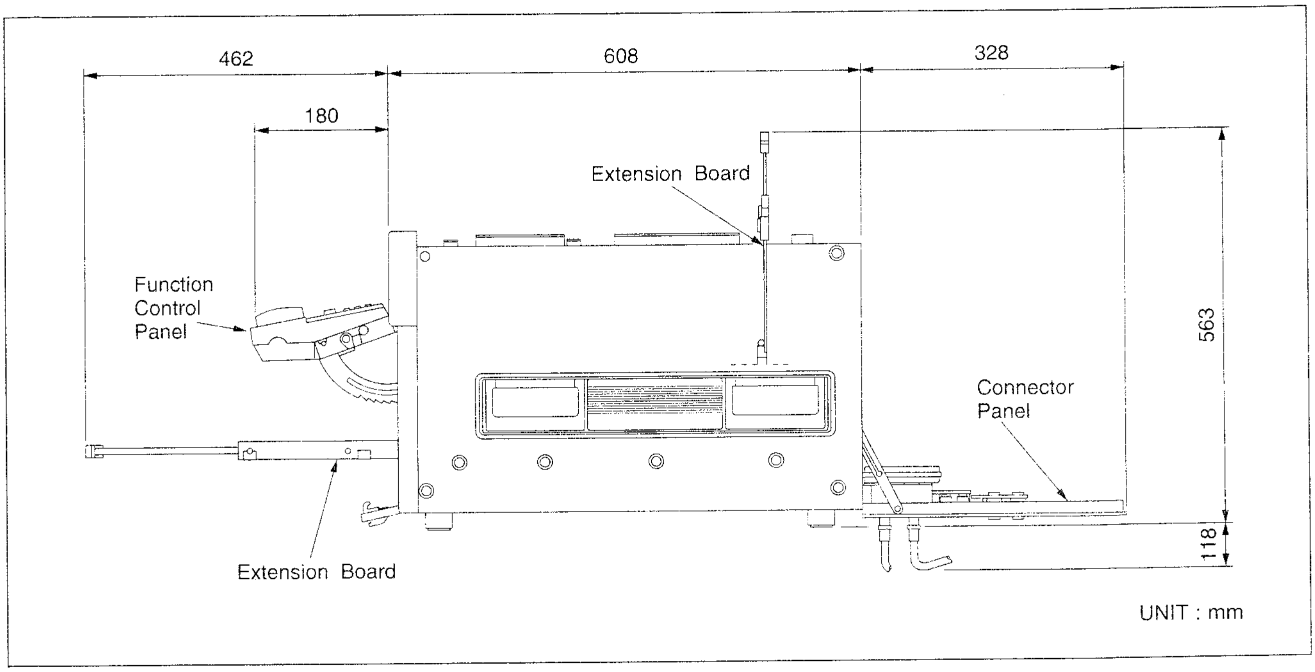
① BKDV-200/201/202 (This illustration is BKDV-201.)


40
5
20
96
172
D-2
38
46.5
81
13
423
20
20
42
2
42
8.5
8.5
9.5(PULL)
5(PUSH)
UNIT : mm

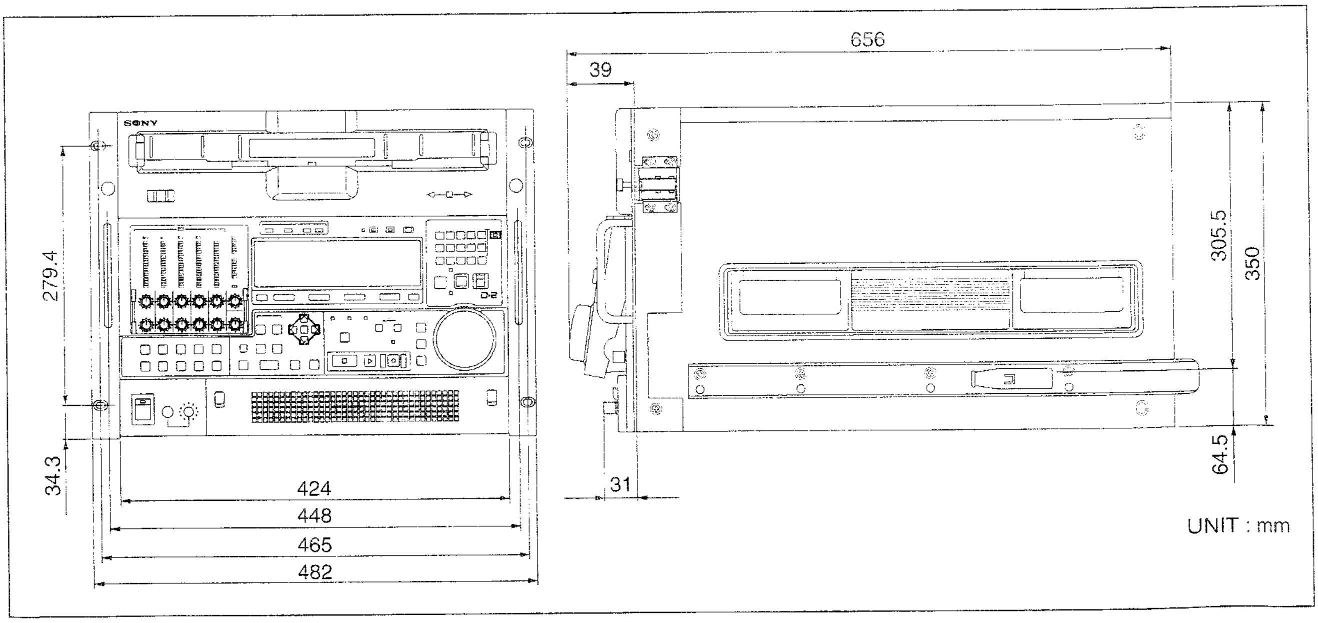
② BKDV-101


12
40
20
98
174
38
82
46.5
423
20
20
2
42
66
6.5
6.5
UNIT : mm

(4) Working Space
For BKDV-200/201/202/101
(BKDV-201 is installed in this illustration.)


462
608
328
180
Extension Board
Function Control Panel
563
Connector Panel
118
Extension Board
UNIT : mm

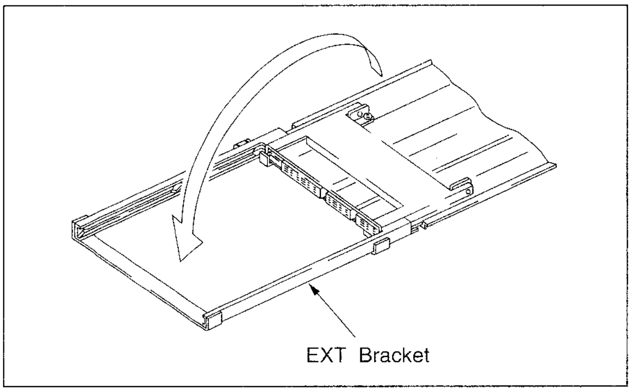
(5) When rack-mounting
For BKDV-200/201/202/101
(BKDV-201 is installed in this illustration.)


656
39
SONY
279.4
305.5
350
34.3
424
448
465
482
31
64.5
UNIT : mm

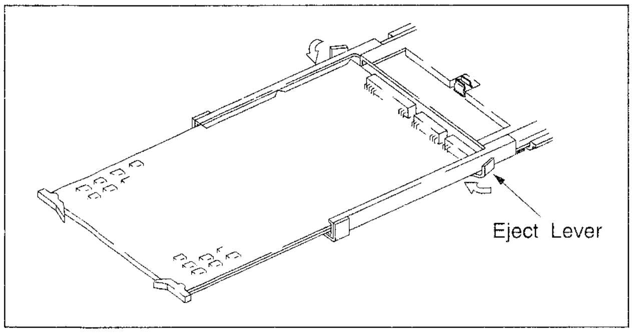
1-6. USING THE EXTENSION BOARD, EX-341/341 (A)

Not supplied DVR-P28 NTSC with equipment
When the extension board EX-341/341 (A) is used, install as follows:

(1) Open the EXT Bracket in the direction of the arrow so that the stopper is inserted and fixed into the holder as shown in the figure.


EXT Bracket

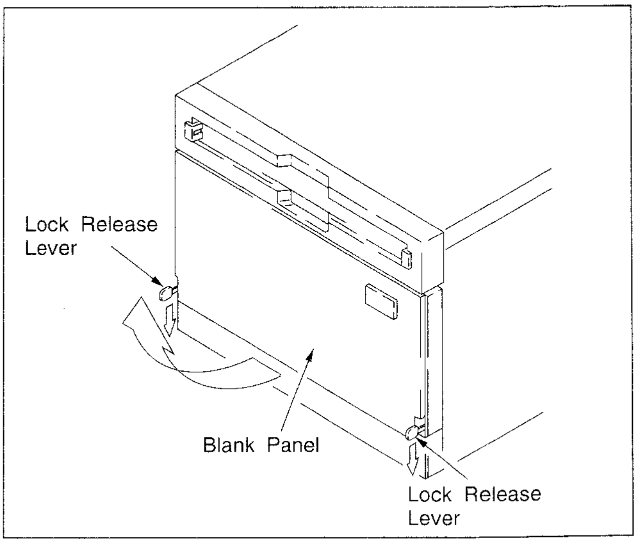
(2) When removing the mounted circuit board from the extension board, pull the eject levers in the direction of the arrows.


Eject Lever

1-7. INSTALLING THE FUNCTION CONTROL PANEL

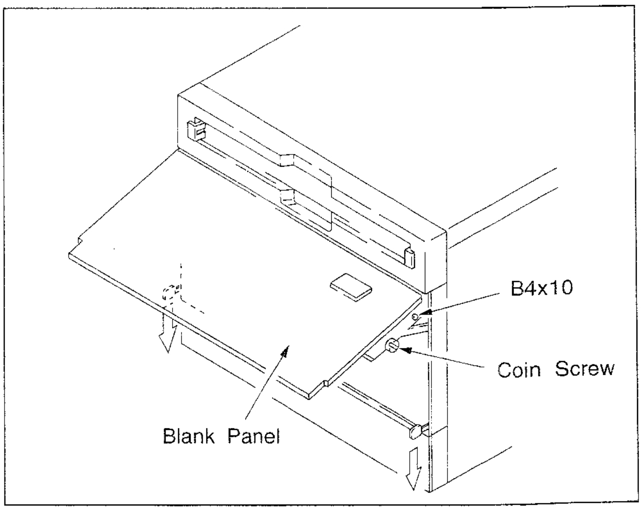
1-7-1. Blank Panel Removal

(1) Push down the lock release levers, and open the blank panel to lock the blank panel.


Lock Release Lever
Blank Panel
Lock Release Lever

(2) Loosen the coin screws (one on each side) fully, and loosen the two screws (B4x10) two turns.

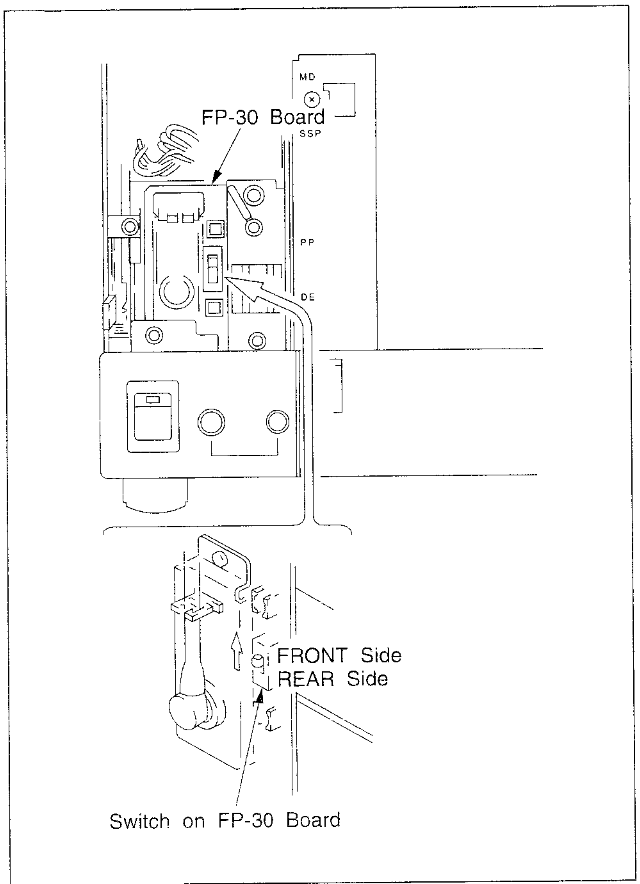
(3) Lift the blank panel toward the front and remove it in the direction of the arrow.


B4x10
Coin Screw
Blank Panel

1-7-2. Installing the Function Control Panel

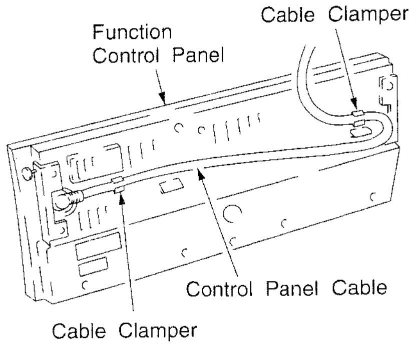
When installing the control panel on the unit

(1) Check that the switch on FP-30 board located at the front of the VTR, is set to FRONT side.

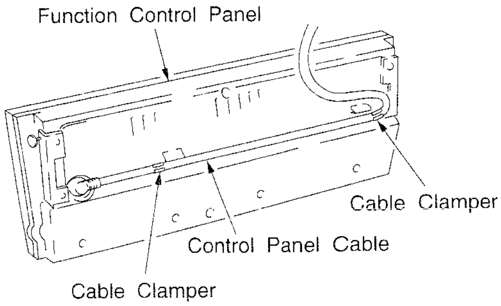

FP-30 Board
MD
SSP
PP
DE
FRONT Side
REAR Side
Switch on FP-30 Board

(2) Connect the control panel cable provided with the unit to the function control panel, and fix the control panel cable using the cable clamper to prevent the cable from becoming slack.

BKDV-101

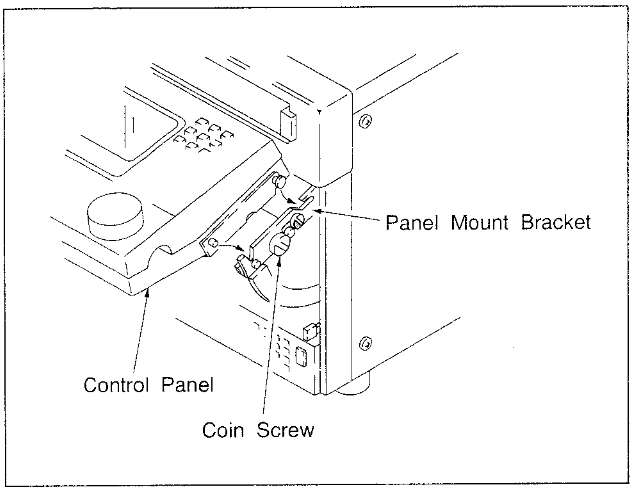

Function Control Panel
Cable Clamper
Control Panel Cable
Cable Clamper

BKDV-200/201

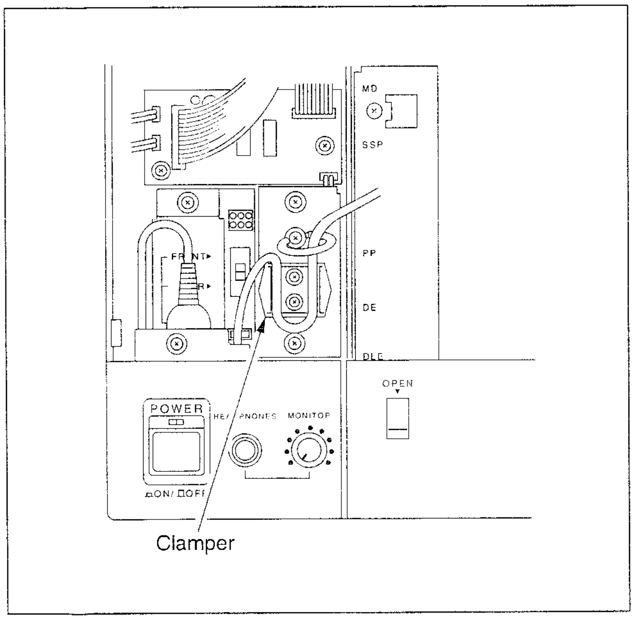

Function Control Panel
Cable Clamper
Control Panel Cable
Cable Clamper

(3) Install the control panel on the panel mount bracket of the unit, and tighten the coin screws (one on each side).

Note: Be careful not to catch the control panel cable.

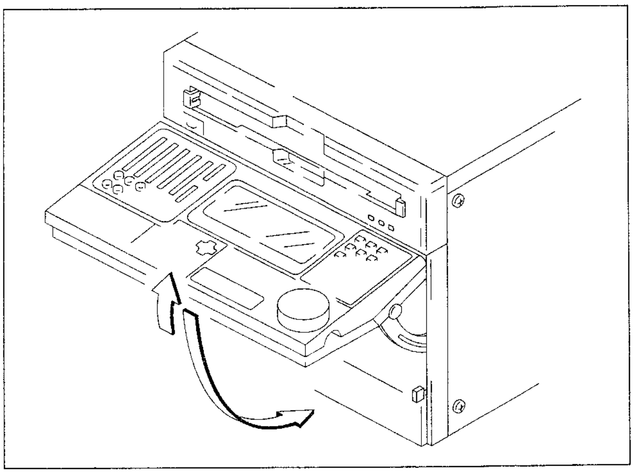

Panel Mount Bracket
Control Panel
Coin Screw

(4) Fix the remaining cable using the panel and unit clampers.


MD
SSP
PP
DE
DLE
OPEN
POWER
MONITOR
ON/ OFF
Clamper

(5) Release the locks while lifting the function control panel a little.
Push it down and shut it.

Note: When shutting the function control panel, check that the control panel cable is not caught between the control panel and the stay (left side). If the control panel cable is caught, perform step (2) again.

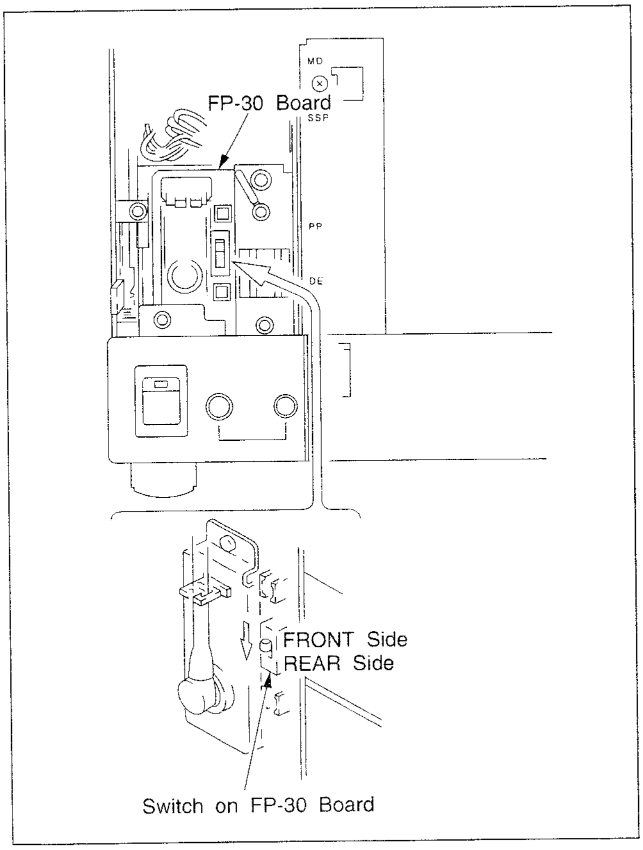


When using the unit remotely

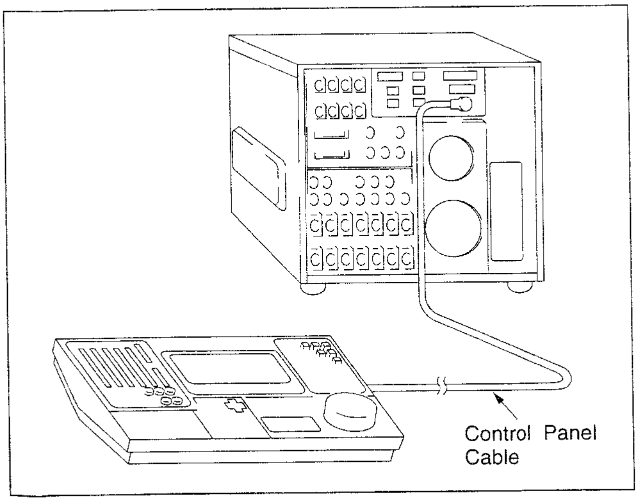
(1) Provide the following cable.
Control Panel Cable, 10m:
Sony part number 1-559-936-11

(2) Set the switch on FP-30 board to rear side.

Note: When the switch is set to rear side, the front control panel is disabled.


MD
FP-30 Board
SSP
PP
DE
FRONT Side
REAR Side
Switch on FP-30 Board

(3) Connect the control panel cable (10m) between the control panel and the connector panel.


Control Panel Cable

1-8. INPUT/OUTPUT INTERFACE

1-8-1. Matching Connectors and Cables

◎: Not used for DVR-P28 (NTSC)

VTR Connector		Matching Connectors/Cables	
Used for	**Type**	**Connectors**	**Sony Part No.**
DIGITAL VIDEO INPUT (PARALLEL) (DVR-28) ◎ DIGITAL VIDEO OUTPUT (PARALLEL) TEST INPUT (DVR-P28 NTSC)	D-sub, 25pin, Female	D-sub, 25pin, Male VCD-2D/5D/10D/30D CABLE	1-566-356-11 Optional Accessory **(Note 1)**
ANALOG VIDEO INPUT VIDEO (LOOP-THROUGH) ◎ ANALOG VIDEO INPUT REF (LOOP-THROUGH) ANALOG VIDEO INPUT CF PULSE	BNC	BNC	
ANALOG VIDEO OUTPUT VIDEO-1, 2, 3 ANALOG VIDEO OUTPUT CF PULSE ANALOG VIDEO OUTPUT MONITOR ANALOG VIDEO OUTPUT WFM ANALOG VIDEO OUTPUT CHARACTER	BNC	BNC	
DIGITAL SERIAL V/A INPUT ◎ DIGITAL SERIAL V/A THROUGHOUT ◎ DIGITAL SERIAL V/A SERIAL OUT-1, 2, 3	BNC	BNC	
DIGITAL AUDIO INPUT CH-1 ◎ DIGITAL AUDIO INPUT CH-2 ◎ DIGITAL AUDIO INPUT CH-3 ◎ DIGITAL AUDIO INPUT CH-4 ◎	XLR 3pin, Female XLR 3pin, Female XLR 3pin, Female XLR 3pin, Female	ECD-3C/10C/30C CABLE	Optional Accessory **(Note 2)**
DIGITAL AUDIO OUTPUT CH-1 DIGITAL AUDIO OUTPUT CH-2 DIGITAL AUDIO OUTPUT CH-3 DIGITAL AUDIO OUTPUT CH-4	XLR 3pin, Male XLR 3pin, Male XLR 3pin, Male XLR 3pin, Male	ECD-3C/10C/30C CABLE	Optional Accessory **(Note 2)**
ANALOG AUDIO INPUT CH-1, 2, 3, 4 ◎	XLR 3pin, Female	XLR 3pin, Male	1-508-084-11 **(Note 4)**
ANALOG AUDIO OUTPUT CH-1, 2, 3, 4	XLR 3pin, Male	XLR 3pin, Female	1-508-083-11 **(Note 3)**
ANALOG AUDIO CUE INPUT ◎	XLR 3pin, Female	XLR 3pin, Male	1-508-084-11 **(Note 4)**
ANALOG AUDIO CUE OUTPUT	XLR 3pin, Male	XLR 3pin, Female	1-508-083-11 **(Note 3)**
ANALOG TIME CODE INPUT ◎	XLR 3pin, Female	XLR 3pin, Male	1-508-084-11 **(Note 4)**
ANALOG TIME CODE OUTPUT	XLR 3pin, Male	XLR 3pin, Female	1-508-083-11 **(Note 3)**
ANALOG MONITOR L	XLR 3pin, Male	XLR 3pin, Female	1-508-083-11 **(Note 3)**
ANALOG MONITOR R	XLR 3pin, Male	XLR 3pin, Female	1-508-083-11 **(Note 3)**
RS-422 REMOTE-IN RS-422 REMOTE-OUT RS-422REMOTE-IN/OUT	D-sub, 9pin, Female	D-sub, 9pin, Male RCC-5G/10G/30G CABLE	1-509-140-00 Optional Accessory **(Note 5)**
RS-232C	D-sub, 25pin, Female	D-sub, 25pin, Male	1-566-356-11
PARALLEL I/O	D-sub, 50pin, Female	D-sub, 50pin, Male	1-566-358-11
V/A CONTROL	D-sub, 15pin, Female	D-sub, 15pin, Male	1-566-355-11
REMOTE-IN	D-sub, 15pin, Female	D-sub, 15pin, Male	1-566-355-11
GP-IB	GP-IB	GP-IB(IEEE-488)	
CONTROL PANEL	MULTI, 8pin	CONTROL PANEL CABLE	**(Note 6)**
HEADPHONES	6ø Phone Jack	6ø Phone Jack	

(Note 1) Digital video input/output cables. The length of the cables are 2 m, 5 m, 10 m and 30 m.

(Note 2) Digital audio input/output cables. The length of the cables are 3 m, 10 m, and 30 m.

(Note 3) Equivalent to CANNON XLR-3-11C.

(Note 4) Equivalent to CANNON XLR-3-12C.

(Note 5) The length of the cables are 5 m, 10 m and 30 m.

(Note 6) The length of the cables are 0.8 m (1-559-692-12) , 2m (1-559-107-11) and 10 m (1-559-936-11). One cable (0.8 m) is supplied with DVR-28/28P.

1-8-2. Signal Inputs and Outputs

(1) VIDEO

DVR-28/P28 (NTSC)

◎: Not used for DVR-P28 (NTSC)

Connector	Specifications
VIDEO INPUT (DVR-28) TEST INPUT (DVR-P28 NTSC)	
Analog	1.0 V±0.3 Vp-p, 75 Ω
Digital	Parallel interface: SMPTE T14.224/082A format ◎ Serial V/A interface: 0.8 Vp-p, 75 Ω SMPTE T14.224×2131D
Reference	Composite signal (black burst) Sync & burst: 0.3 Vp-p, 75 Ω
VIDEO OUTPUT	
Analog	ANALOG VIDEO-1/2 OUTPUT: 1.0 Vp-p, 75 Ω ANALOG VIDEO-3 OUTPUT: 1.0 Vp-p, 75 Ω Composite/non-composite switchable CHARACTER OUTPUT: 1 Vp-p, 75 Ω MONITOR OUTPUT: 1 Vp-p, 75 Ω
Digital	Parallel interface: SMPTE T14.224/082A format Serial V/A interface: 0.8 Vp-p, 75 Ω, SMPTE T14.224×2131D

DVR-28P

Connector	Specifications
VIDEO INPUT	
Analog	1.0 V±0.3 Vp-p, 75 Ω
Digital	Parallel interface: ECL balanced Serial V/A interface: 0.8 Vp-p, 75 Ω
Reference	Composite signal (black burst) Sync & burst: 0.3 Vp-p, 75 Ω
VIDEO OUTPUT	
Analog	ANALOG VIDEO-1/2 OUTPUT: 1.0 Vp-p, 75 Ω ANALOG VIDEO-3 OUTPUT: 1.0 Vp-p, 75 Ω Composite/non-composite switchable CHARACTER OUTPUT: 1 Vp-p, 75 Ω MONITOR OUTPUT: 1 Vp-p, 75 Ω
Digital	Parallel interface: ECL balanced Serial V/A interface: 0.8 Vp-p, 75 Ω,

(2) AUDIO

DVR-28/P28 (NTSC)

◎: Not used for DVR-P28 (NTSC)

Connector	Specifications
◎AUDIO INPUT	
Analog	CH1, CH2, CH3, CH4: +28 dBm max. (+8 dBm normal), 150 Ω/600 Ω/HIGH impedance
Digital	CH1, CH2, CH3, CH4: AES/EBU format Serial V/A: 0.8 Vp-p, 75 Ω SMPTE T14.224×2131D (Video & Audio)
Cue channel	LINE input: +18 dBm max. (+8 dBm normal), 150 Ω/600 Ω/HIGH impedance MIC input: −44 dBm max. (−60 dBm normal), high impedance
AUDIO OUTPUT	
Analog	CH1, CH2, CH3, CH4: +28 dBm max. (+8 dBm normal)
Digital	CH1, CH2, CH3, CH4: AES/EBU format Serial V/A: 0.8 Vp-p, 75 Ω SMPTE T14.224×2131D (Video & Audio)
Cue channel	CUE: +18 dBm max.(+8 dBm normal), low impedance
Monitor output	MONITOR L/R: +28 dBm max. (+8 dBm normal), low impedance
Headphones output level	Variable (adjustable with VR control)

DVR-28P

Connector	Specifications
AUDIO INPUT	
Analog	CH1, CH2, CH3, CH4: +28 dBm max. (+8 dBm normal), 150 Ω/600 Ω/HIGH impedance
Digital	CH1, CH2, CH3, CH4: AES/EBU format Serial V/A: 0.8 Vp-p, 75 Ω
Cue channel	LINE input: +18 dBm max. (+8 dBm normal), 150 Ω/600 Ω/HIGH impedance MIC input: −44 dBm max. (−60 dBm normal), high impedance
AUDIO OUTPUT	
Analog	CH1, CH2, CH3, CH4: +28 dBm max. (+8 dBm normal)
Digital	CH1, CH2, CH3, CH4: AES/EBU format Serial V/A: 0.8 Vp-p, 75 Ω
Cue channel	CUE: +18 dBm max.(+8 dBm normal), low impedance
Monitor output	MONITOR L/R: +28 dBm max. (+8 dBm normal), low impedance
Headphones output level	Variable (adjustable with VR control)

(3) GENERAL

Connector	Specifications
CF PULSE IN/OUT	TTL level
WFM OUT	1.0 Vp-p, 75 Ω Video/CTL/RF envelope (A/C, B/D, all channels) selectable

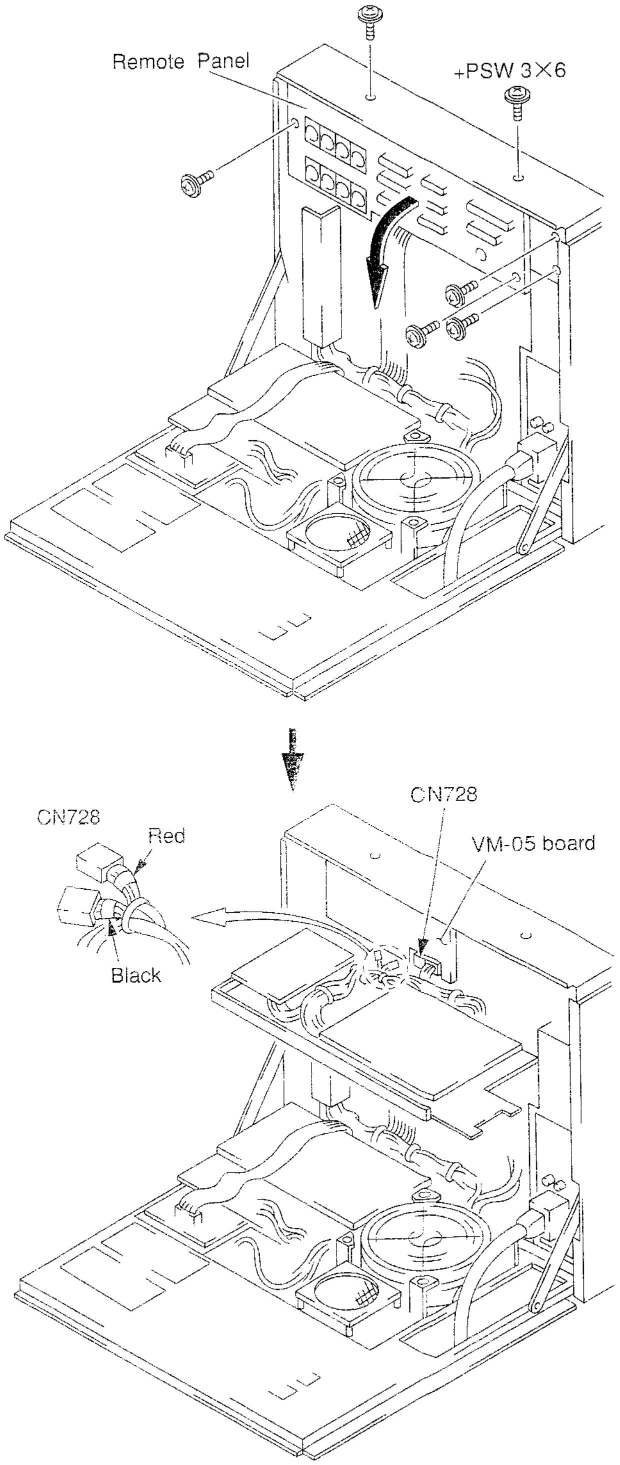
The AUX output of WFM OUT connector do not connect when the unit is shipped from the factory. If the connector (CN728) connects onto the VM-05 Board, the AUX output of the WFM OUT connector can output the playback output of Record Head or TIME CODE.

Note : In the case of DVR-P20/P28, the AUX output of the WFM OUT connector can output only the TIME CODE.

Connection

① Turn the power off.
② Open the Connector Panel according to the procedure shown in Section 2-4.
③ Remove the six screws (+PSW 3×6) and remove the Remote Panel.
④ Connect the connector (CN728) onto the VM-05 Board.

Note : The connector (CN728) have the two color markers (Red and Black). Select the connector which have the color marker after checking the connector which you want to connect.
Red : The playback output of the Record Head
Black : The output of the TIME CODE

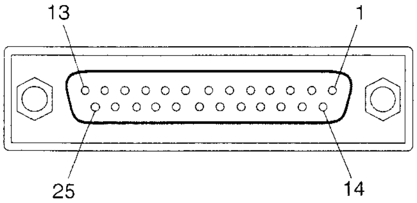


(4) TIME CODE

Connector	Specifications
TIME CODE INPUT TIME CODE OUTPUT	2.4 V±1.4 Vp-p, 10 kΩ 2.4 Vp-p, low impedance

(5) DIGITAL VIDEO INPUT Connector (DVR-28)
TEST INPUT Connector (DVR-P28 NTSC)

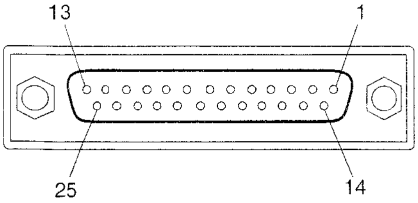
- Outside View -



Pin No.	Signal	Spec.
1	CLOCK	ECL
2	SYSTEM GROUND	
3	DATA 7 (MSB)	ECL
4	DATA 6	ECL
5	DATA 5	ECL
6	DATA 4	ECL
7	DATA 3	ECL
8	DATA 2	ECL
9	DATA 1	ECL
10	DATA 0	ECL
11	DATA A	ECL
12	DATA B	ECL
13	CHASSIS GROUND	
14	CLOCK RET.	ECL
15	SYSTEM GROUND	
16	DATA 7 RET.	ECL
17	DATA 6 RET.	ECL
18	DATA 5 RET.	ECL
19	DATA 4 RET.	ECL
20	DATA 3 RET.	ECL
21	DATA 2 RET.	ECL
22	DATA 1 RET.	ECL
23	DATA 0 RET.	ECL
24	DATA A RET.	ECL
25	DATA B RET.	ECL

(6) DIGITAL VIDEO OUTPUT Connector

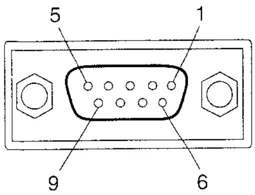
- Outside View -



Pin No.	Signal	Spec.
1	CLOCK	ECL
2	SYSTEM GROUND	
3	DATA 7 (MSB)	ECL
4	DATA 6	ECL
5	DATA 5	ECL
6	DATA 4	ECL
7	DATA 3	ECL
8	DATA 2	ECL
9	DATA 1	ECL
10	DATA 0	ECL
11	DATA A	ECL
12	DATA B	ECL
13	CHASSIS GROUND	
14	CLOCK RET.	ECL
15	SYSTEM GROUND	
16	DATA 7 RET.	ECL
17	DATA 6 RET.	ECL
18	DATA 5 RET.	ECL
19	DATA 4 RET.	ECL
20	DATA 3 RET.	ECL
21	DATA 2 RET.	ECL
22	DATA 1 RET.	ECL
23	DATA 0 RET.	ECL
24	DATA A RET.	ECL
25	DATA B RET.	ECL

(7) RS-422 REMOTE IN Connector

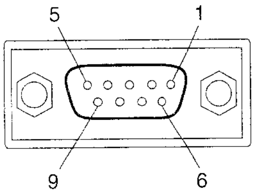
- Outside View -



Pin No.	Signal	Spec.	Description
1	FRAME GND		
2	REM-A IN -	0 to +5V	CMD LINE (-)
3	REM-A OUT +	0 to +5V	STATUS LINE (+)
4	GND		
5	NC		
6	GND		
7	REM-A IN +	0 to +5V	CMD LINE (+)
8	REM-A OUT -	0 to +5V	STATUS LINE (-)
9	FRAME GND		

(8) RS-422 REMOTE OUT Connector

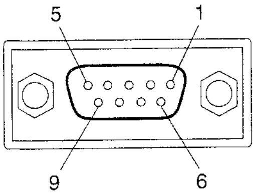
- Outside View -



Pin No.	Signal	Spec.	Description
1	FRAME GND		
2	REM-B IN -	0 to +5V	CMD LINE (-)
3	REM-B OUT +	0 to +5V	STATUS LINE (+)
4	GND		
5	NC		
6	GND		
7	REM-B IN +	0 to +5V	CMD LINE (+)
8	REM-B OUT -	0 to +5V	STATUS LINE (-)
9	FRAME GND		

(9) RS-422 REMOTE IN/OUT Connector

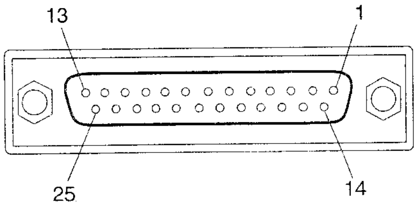
- Outside View -



Pin No.	Signal	Spec.	Description
1	FRAME GND		
2	REM-C IN -	0 to +5V	CMD LINE (-)
3	REM-C OUT +	0 to +5V	STATUS LINE (+)
4	GND		
5	NC		
6	GND		
7	REM-C IN +	0 to +5V	CMD LINE (+)
8	REM-C OUT -	0 to +5V	STATUS LINE (-)
9	FRAME GND		

(10) RS-232C Connector

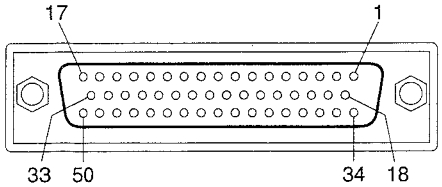
- Outside View -



Pin No.	Signal	Spec.	Description
1	FRAME GND		
2	TX	-25 to +25V, MAX	TRANSMIT
3	RX	-25 to +25V, MAX	RECEIVE
4	RTS	-25 to +25V, MAX	REQUEST TO SEND
5	CTS	-25 to +25V, MAX	CLEAR TO SEND
6	DSR	-25 to +25V, MAX	DATA SET READY
7	GND		SIGNAL GROUND
8	DCR	-25 to +25V, MAX	CARRIER DETECT
9	NC		
10	NC		
11	NC		
12	NC		
13	NC		
14	NC		
15	NC		
16	NC		
17	NC		
18	NC		
19	NC		
20	DTR	-25 to +25V, MAX	DATA TERMINAL READY
21	NC		
22	NC		
23	NC		
24	NC		
25	NC		

(11) PARALLEL I/O Connector

- Outside View -



Pin. No.	Signal	Spec.	Description
① **(Note 3)**	FF IN	Close/Open **(Note 1)**	FF CLOSURE SW
2	REC SW OUT	OV or Open **(Note 2)**	PANEL REC SW OUT
3	PLAY SW OUT	OV or Open **(Note 2)**	PANEL PLAY SW OUT
4	STOP SW OUT	OV or Open **(Note 2)**	PANEL STOP SW OUT
5	ENTRY SW OUT	OV or Open **(Note 2)**	PANEL ENTRY SW OUT
6	REF ERROR OUT	OV or Open **(Note 2)**	Non-REFERENCE
7	CF LOCK OUT	OV or Open **(Note 2)**	CF LOCK STATUS
8	DRUM LOCK OUT	OV or Open **(Note 2)**	LOCK STATUS OF DRUM SERVO
9	CAMP LOCK OUT	OV or Open **(Note 2)**	LOCK STATUS OF CAPSTAN SERVO
⑩ **(Note 3)**	CUE PRESET OUT	OV or Open **(Note 2)**	EDIT PRESET STATUS of the CUE Channel
⑪ **(Note 3)**	TC PRESET OUT	OV or Open **(Note 2)**	EDIT PRESET STATUS of the TC Channel
⑫ **(Note 3)**	CODING HOLE #4 OUT	OV or Open **(Note 2)**	CODING HOLE #4 STATUS
⑬ **(Note 3)**	CODING HOLE #2 OUT	OV or Open **(Note 2)**	CODING HOLE #2 STATUS
14	USER HOLE #4 OUT	OV or Open **(Note 2)**	USER HOLE #4 STATUS
15	USER HOLE #2 OUT	OV or Open **(Note 2)**	USER HOLE #2 STATUS
16	+12V		
17	GND		SIGNAL GND
⑱ **(Note 3)**	PREROLL IN	Close/Open **(Note 1)**	CLOSURE SW (PREROLL)
⑲ **(Note 3)**	STBY ON IN	Close/Open **(Note 1)**	CLOSURE SW (STAND BY ON)
⑳ **(Note 3)**	REW IN	Close/Open **(Note 1)**	CLOSURE SW (REW)
㉑ **(Note 3)**	ENTRY IN	Close/Open **(Note 1)**	CLOSURE SW (ENTRY IN)
㉒ **(Note 3)**	STBY OFF IN	Close/Open **(Note 1)**	CLOSURE SW (STAND BY OFF)
㉓ **(Note 3)**	EJECT IN	Close/Open **(Note 1)**	CLOSURE SW (EJECT)
24	REC OUT	OV or Open **(Note 2)**	REC STATUS
25	SYNC LACK OUT	OV or Open **(Note 2)**	Non-RF Signal (High error rate)
㉖ **(Note 3)**	ASSEMBLE PRE OUT	OV or Open **(Note 2)**	ASSEMBLE PRESET STATUS
㉗ **(Note 3)**	EDIT OUT	OV or Open **(Note 2)**	EDIT STATUS
㉘ **(Note 3)**	EJECT OUT	OV or Open **(Note 2)**	EJECT STATUS
㉙ **(Note 3)**	CODING HOLE #3 OUT	OV or Open **(Note 2)**	CODING HOLE #3 STATUS
㉚ **(Note 3)**	CODING HOLE #1 OUT	OV or Open **(Note 2)**	CODING HOLE #1 STATUS
31	USER HOLE #3 OUT	OV or Open **(Note 2)**	USER HOLE #3 STATUS
32	USER HOLE #1 OUT	OV or Open **(Note 2)**	USER HOLE #1 STATUS
33	GND		
㉞ **(Note 3)**	PLAY IN	Close/Open **(Note 1)**	CLOSURE SW (PLAY)
㉟ **(Note 3)**	STOP IN	Close/Open **(Note 1)**	CLOSURE SW (STOP)
㊱ **(Note 3)**	REC IN	Close/Open **(Note 1)**	CLOSURE SW (REC)
37	REV LAMP OUT	OV or Open **(Note 2)**	REV LAMP STATUS
㊳ **(Note 3)**	A2 PRESET OUT	OV or Open **(Note 2)**	A2 EDIT PRESET STATUS
㊴ **(Note 3)**	A1 PRESET OUT	OV or Open **(Note 2)**	A1 EDIT PRESET STATUS
40	FWD LAMP OUT	OV or Open **(Note 2)**	FWD LAMP STATUS
㊶ **(Note 3)**	A4 PRESET OUT	OV or Open **(Note 2)**	A4 EDIT PRESET STATUS
㊷ **(Note 3)**	A3 PRESET OUT	OV or Open **(Note 2)**	A3 EDIT PRESET STATUS
43	STOP OUT	OV or Open **(Note 2)**	STOP STATUS
㊹ **(Note 3)**	VIDEO PRESET OUT	OV or Open **(Note 2)**	VIDEO EDIT PRESET STATUS
㊺ **(Note 3)**	INSERT PRESET OUT	OV or Open **(Note 2)**	INSERT EDIT PRESET STATUS
46	STBY ON OUT	OV or Open **(Note 2)**	STAND BY ON STATUS
47	PLAY OUT	OV or Open **(Note 2)**	PLAY STATUS
48	REMOTE OUT	OV or Open **(Note 2)**	REMOTE STATUS
49	ALARM OUT	OV or Open **(Note 2)**	SYSTEM ALARM STATUS
㊿ **(Note 3)**	PREROLL OUT	OV or Open **(Note 2)**	

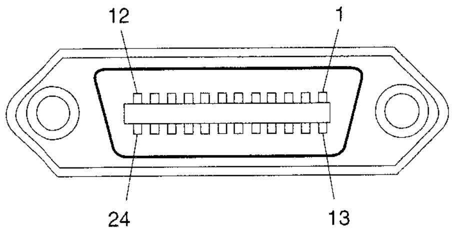
(Note 1) 47 kohm pull up to +5V

(Note 2) 10 kohm pull up to +5V

(Note 3) The signal levels of ○ marked pin number are for factory settings.
These signal levels can be set for user side.

(12) GP-IB Connector

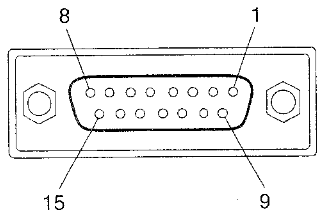
- Outside View -



Pin No.	Signal	Spec.	Description
1	DIO 1	0 to +5V, MAX	DATA I/O 1
2	DIO 2	0 to +5V, MAX	DATA I/O 2
3	DIO 3	0 to +5V, MAX	DATA I/O 3
4	DIO 4	0 to +5V, MAX	DATA I/O 4
5	EOI	0 to +5V, MAX	END OF IDENTIFY
6	DAV	0 to +5V, MAX	DATA VALID
7	NRFD	0 to +5V, MAX	NOT READY FOR DATA
8	NDAC	0 to +5V, MAX	NOT DATA ACCEPED
9	IFC	0 to +5V, MAX	INTERFACE CLR
10	SRQ	0 to +5V, MAX	SERVICE REQUEST
11	ATN	0 to +5V, MAX	ATTENTION
12	FRAME GND		
13	DIO 5	0 to +5V, MAX	DATA I/O 5
14	DIO 6	0 to +5V, MAX	DATA I/O 6
15	DIO 7	0 to +5V, MAX	DATA I/O 7
16	DIO 8	0 to +5V, MAX	DATA I/O 8
17	REN	0 to +5V, MAX	REMOTE ENABLE
18	FRAME GND		
19	FRAME GND		
20	FRAME GND		
21	FRAME GND		
22	FRAME GND		
23	FRAME GND		
24	GND		LOGIC GROUND

(13) V/A CONTROL Connector

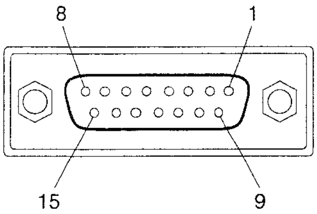
- Outside View -



Pin No.	Signal	Spec.	Description
1	FRAME GND		
2	NC		
3	NC		
4	REM (G)		
5	REM A34 (X)	0 to +5V, MAX	D. AUDIO 3,4 AES FORMAT OUTPUT
6	REM A12 (X)	0 to +5V, MAX	D. AUDIO 1,2 AES FORMAT OUTPUT
7	REM RX (X)	0 to +5V, MAX	REMOTE CONTROL PROTCOL RECEIVE
8	REM TX (X)	0 to +5V, MAX	REMOTE CONTROL PROTCOL TRANSMIT
9			
10			
11			
12	REM A34 (Y)	0 to +5V, MAX	D. AUDIO 3,4 AES FORMAT OUTPUT
13	REM A12 (Y)	0 to +5V, MAX	D. AUDIO 1,2 AES FORMAT OUTPUT
14	REM RX (Y)	0 to +5V, MAX	REMOTE CONTROL PROTCOL RECEIVE
15	REM TX (Y)	0 to +5V, MAX	REMOTE CONTROL PROTCOL TRANSMIT

(14) REMOTE IN

- Outside View -



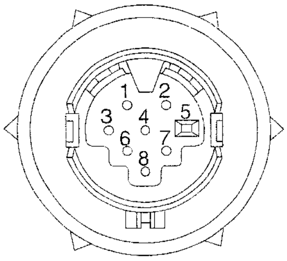
Pin No.	Signal	Spec.	Description
1	N.C		
2	RX (–)	0 to +5V	RECEIVE DATA (–)*
3	TX (–)	0 to +5V	TRANSMIT DATA (–)*
4	N.C		
5	N.C		
6	N.C		
7	N.C		
8	SPARE		
9	GND		
10	RX (+)	0 to +5V	RECEIVE DATA (+)*
11	TX (+)	0 to +5V	TRANSMIT DATA (+)*
12	+12V		POWER SUPPLY
13	FRAME GND		GND
14	GND		
15	N.C		

* Asynchronous, bit serial signal

- Based on the EIA RS-422-A
- Full duplex communication channels

(15) CONTROL PANEL Connector

- Outside View -

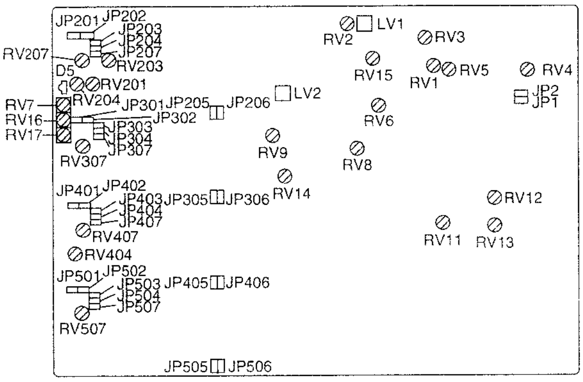


Pin No.	Signal	Spec.	Description
1	NC		
2	RS Bch C (-)	0 to +5V	COMMAND LINE (-)
3	RS Bch S (+)	0 to +5V	STATUS LINE (+)
4	GND		
5	+22V		POWER +22 V UNREGURATED DC
6	GND		
7	RS Bch C(+)	0 to +5V	COMMAND LINE (+)
8	RS Bch S (-)	0 to +5V	STATUS LINE (-)

1-9. SWITCH/JUMPER/INDICATOR/ADJUSTMENT SETTINGS

The factory setting can be changed according to the operating conditions as follows:

AD-73 Board (DVR-28)
AD-73P Board (DVR-28P)
Printed Circuit Board (–11)
S/N 10001 to 10699: DVR-28 (UC)
S/N 10001 to 10599: DVR-28P (EK, UC)
Not used for DVR-P28 (NTSC)



A SIDE

Indicator

D5 (C1): ANALOG IN indicator (green)
This indicator lights when the ANALOG VIDEO signal is present.

Jumpers

(1) JP1, JP2 (C21): INTERNAL alignment
JP1: NORMAL
JP2: INTERNAL
When shipped, set to JP1. When adjusting RV9, set to JP2.

(2) Analog Audio Reference Level Setting
The reference levels are set to +8 dBm when shipped.

Reference Level	CH-1	CH-2	CH-3	CH-4
0 to +4 dBm	JP204/SHORT	JP304/SHORT	JP404/SHORT	JP504/SHORT
+8 dBm	JP203/SHORT	JP303/SHORT	JP403/SHORT	JP503/SHORT
-20 dBm	JP207/SHORT	JP307/SHORT	JP407/SHORT	JP507/SHORT

(3) Audio Input Impedance Setting
The input impedance can be changed according to the setting of the JP (jumper pins) as follows.
When shipped, set to 600 ohm.

	CH-1	CH-2	CH-3	CH-4
600 ohm	JP201/SHORT	JP301/SHORT	JP401/SHORT	JP501/SHORT
150 ohm	JP202/SHORT	JP302/SHORT	JP402/SHORT	JP502/SHORT
High Impedance	JP201,JP202 OPEN	JP301,JP302 OPEN	JP401,JP402 OPEN	JP501,JP502 OPEN

(4) Dither ON/OFF Setting
When set to the ON position, the dither operates and the setting is changed to 16 bit.
When shipped, set to the OFF position.
Usually set to the OFF position.

DITHER	CH-1	CH-2	CH-3	CH-4
OFF	JP205/SHORT	JP305/SHORT	JP405/SHORT	JP505/SHORT
ON	JP206/SHORT	JP306/SHORT	JP406/SHORT	JP506/SHORT

Adjustments

RV1 (B16) : AD alignment
This adjustment is used for AD converter matching adjustment.
RV2 (A13) : Not used.
RV3 (A16) : AD Reference alignment
This adjustment is used for AD converter reference voltage.
RV4 (C21) : Offset alignment
This adjustment is used for pedestal level adjustment.
RV5 (B17) : HUE alignment
This adjustment is used for 4fsc phase adjustment.
RV6 (C14) : Video Gain alignment
RV7 (C1) : Video Gain fine-alignment
RV8 (E13) : Internal SC Frequency alignment
RV9 (D8) : Internal SC phase alignment
RV11 (G17) : Color Framing alignment
RV12 (F19) : Color Framing Detection Circuit Gain alignment
RV13 (G19) : Color Framing Detection Circuit Offset alignment
RV14 (F9) : Input SC-H alignment
This adjustment is used for SC-H adjustment when INPUT reference selected.
RV15 (B13) : Input Check alignment
This adjustment is used for video level adjustment for input check.
RV16 (D1) : HUE alignment
This adjustment is used for 4fsc fine-adjustment.
RV17 (D1) : Offset fine-alignment
This adjustment is used for video pedestal level fine-adjustment.

RV201 (C1), RV301 (E1), RV401 (H1), RV501 (L1)
: Common Mode Noise Rejection alignment

RV202 (A3) : CH-1 GAIN CONTROL OFFSET NULL
RV302 (D3) : CH-2 GAIN CONTROL OFFSET NULL
RV402 (G3) : CH-3 GAIN CONTROL OFFSET NULL
RV502 (K3) : CH-4 GAIN CONTROL OFFSET NULL
This adjustment is used for UNITY value alignment of audio level control circuit.

RV203 (B2), RV303 (E2), RV403 (G2), RV503 (K2)
: Input Level Variable Range alignment

RV204 (C1), RV205 (C2), RV304 (E1), RV305 (E2),
RV404 (H1), RV405 (H2), RV504 (L1), RV505 (L2)
: VCA THD alignment

RV207 (B1) : Audio Reference Level CH-1 alignment
RV307 (E1) : Audio Reference Level CH-2 alignment
RV407 (G1) : Audio Reference Level CH-3 alignment
RV507 (K1) : Audio Reference Level CH-4 alignment

The reference levels are set to +8 dB when shipped.
However, they can be changed to 0 through +8 dB by the following steps.
Adjust RV207, RV307, RV407 and RV507 as follows:

(1) Connect the audio reference level signal (desired signal and level) to ANALOG AUDIO INPUT.
(2) Push the AUDIO IN key on the Menu select keys to select AUDIO IN menu.
(3) Push F1 through F4 (DA-1 through DA-4) on the Function keys.
(4) CH-1 through CH-4 can be adjusted at the same time. Check that the letters under DA-1 through DA-4 are lit on the display. Push the UNITY/VAR button to change the indication to UNITY.
(5) Push F11 (SCALE) key to change the indication of the scale of the audio peak level meter to FINE.
(6) Adjust these variable resistors checking the audio level meter so that the audio level of each channel is indicated as -20 dB (Indication of the reference level within VTR.).

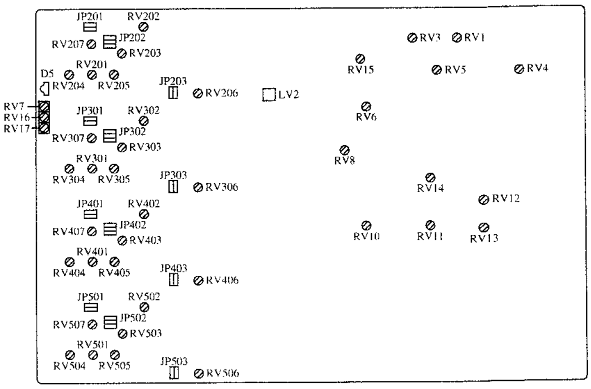
NOTE: Align the LO-14 board for ANALOG AUDIO OUTPUT.

LV1 (A13) : Not used.
LV2 (C9) : Burst Tuning alignment

AD-73 Board (DVR-28)
AD-73P Board (DVR-28P)
Mounted Circuit Board:

Sony part No. A-6019-053-A (DVR-28)
Sony part No. A-6019-054-A (DVR-28P)

Not used for DVR-P28 (NTSC)


JP201
RV202
RV207
JP202
RV203
RV201
D5
RV204
RV205
JP203
RV206
LV2
RV7
RV16
RV17
JP301
RV302
RV307
JP302
RV303
RV301
RV304
RV305
JP303
RV306
JP401
RV402
RV407
JP402
RV403
RV401
RV404
RV405
JP403
RV406
JP501
RV502
RV507
JP502
RV503
RV501
RV504
RV505
JP503
RV506
RV3
RV1
RV15
RV5
RV4
RV6
RV8
RV14
RV12
RV10
RV11
RV13

A SIDE

Indicator

D5 (C1): ANALOG IN indicator (green)
This indicator lights when the ANALOG VIDEO signal is present.

Adjustments

RV1 (A17) : AD alignment
This adjustment is used for AD converter matching adjustment.
RV3 (A16) : AD Reference alignment
This adjustment is used for AD converter reference voltage.
RV4 (C21) : Offset alignment
This adjustment is used for pedestal level adjustment.
RV5 (B17) : HUE alignment
This adjustment is used for 4fsc phase adjustment.
RV6 (C14) : Video Gain alignment
RV7 (C1) : Video Gain fine-alignment
RV10 (G14) : Color Framing Error Detection alignment (For DVR-28P)
RV-11 (G14) : Color Framing alignment (For DVR-28)
RV11 (G17) : Color Framing alignment (For DVR-28P)
RV12 (F19) : Color Framing Detection Circuit Gain alignment
RV13 (G19) : Color Framing Detection Circuit Offset alignment
RV14 (F17) : Input SC-H alignment
This adjustment is used for SC-H adjustment when INPUT reference selected.
RV15 (B13) : Input Check alignment
This adjustment is used for video level adjustment for input check.
RV16 (D1) : HUE alignment
This adjustment is used for 4fsc fine-adjustment.
RV17 (D1) : Offset fine-alignment
This adjustment is used for video pedestal level fine-adjustment.

RV201 (C1), RV301 (E1), RV401 (H1), RV501 (L1)
: Common Mode Noise Rejection alignment

RV202 (B3) : CH-1 GAIN CONTROL OFFSET NULL
RV302 (D3) : CH-2 GAIN CONTROL OFFSET NULL
RV402 (G3) : CH-3 GAIN CONTROL OFFSET NULL
RV502 (K3) : CH-4 GAIN CONTROL OFFSET NULL

This adjustment is used for UNITY value alignment of audio level control circuit.

RV203 (B2), RV303 (E2), RV403 (G2), RV503 (K2)
: Input Level Variable Range alignment

RV204 (C1), RV205 (C2), RV304 (E1), RV305 (E2),
RV404 (H1), RV405 (H2), RV504 (L1), RV505 (L2)
: VCA THD alignment

RV206 (D6), RV306 (F6), RV406 (J6), RV506 (L6)
: Audio Level Meter alignment

RV207 (B1) : Audio Reference Level CH-1 alignment
RV307 (E1) : Audio Reference Level CH-2 alignment
RV407 (G1) : Audio Reference Level CH-3 alignment
RV507 (K1) : Audio Reference Level CH-4 alignment

The reference levels are set to +8 dB when shipped.
However, they can be changed to 0 through +8 dB by the following steps.
Adjust RV207, RV307, RV407 and RV507 as follows:

(1) Connect the audio reference level signal (desired signal and level) to ANALOG AUDIO INPUT.
(2) Push the AUDIO IN key on the Menu select keys to select AUDIO IN menu.
(3) Push F1 through F4 (DA-1 through DA-4) on the Function keys.
(4) CH-1 through CH-4 can be adjusted at the same time. Check that the letters under DA-1 through DA-4 are lit on the display. Push the UNITY/VAR button to change the indication to UNITY.
(5) Push F11 (SCALE) key to change the indication of the scale of the audio peak level meter to FINE.
(6) Adjust these variable resistors checking the audio level meter so that the audio level of each channel is indicated as -20 dB (Indication of the reference level within VTR.).

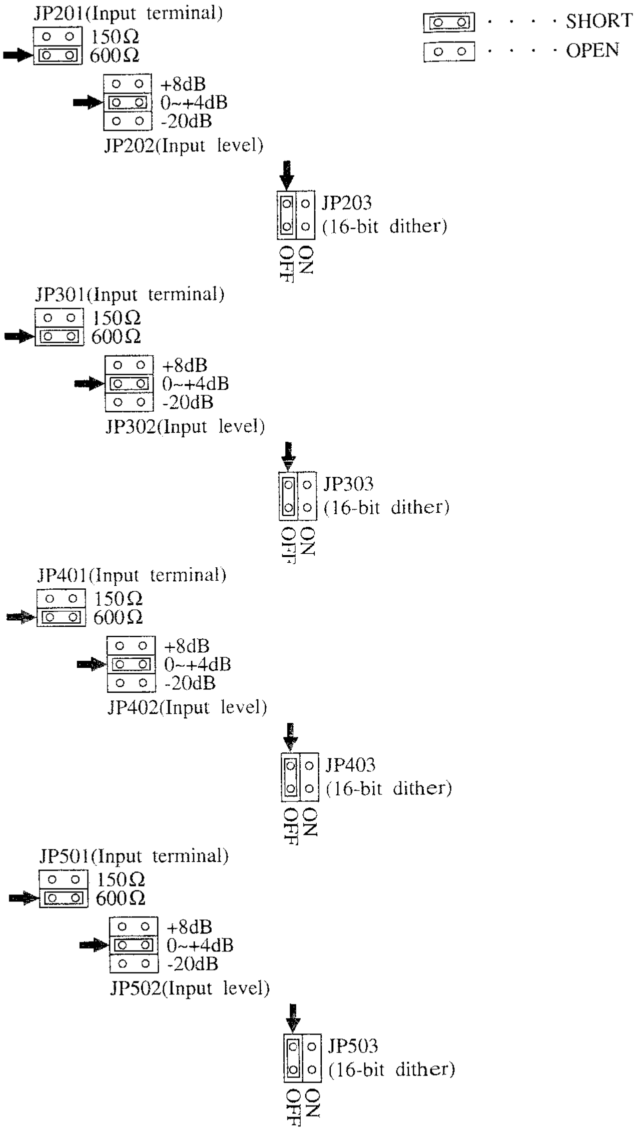
NOTE: Align the LO-14 board for ANALOG AUDIO OUTPUT.

LV2 (C9) : Burst Tuning alignment

Jumpers

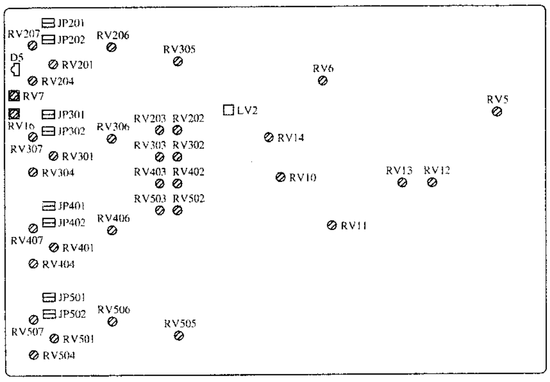
JP201, 301, 401, 501
Input terminal....................................600 Ω
JP202, 302, 402, 502
Input level...0~+4 dB
JP203, 303, 403, 503
16-bit dither.....................................OFF

The jumper initial setting is set to the following arrow position.


SHORT
OPEN
JP201(Input terminal)
150Ω
600Ω
+8dB
0~+4dB
-20dB
JP202(Input level)
JP203
(16-bit dither)
ON
OFF
JP301(Input terminal)
150Ω
600Ω
+8dB
0~+4dB
-20dB
JP302(Input level)
JP303
(16-bit dither)
ON
OFF
JP401(Input terminal)
150Ω
600Ω
+8dB
0~+4dB
-20dB
JP402(Input level)
JP403
(16-bit dither)
ON
OFF
JP501(Input terminal)
150Ω
600Ω
+8dB
0~+4dB
-20dB
JP502(Input level)
JP503
(16-bit dither)
ON
OFF

AD-73 Board (DVR-28)
AD-73P Board (DVR-28P)
Mounted Circuit Board:
Sony part No. A-8275-658-A (DVR-28)
Sony part No. A-8275-659-A (DVR-28P)

Not used for DVR-P28 (NTSC)



A SIDE

Indicator

D5 (C1): ANALOG IN indicator (green)
This indicator lights when the ANALOG VIDEO signal is present.

Adjustments

RV5 (C25) : HUE alignment
This adjustment is used for 4fsc phase adjustment.
RV6 (C16) : Video Gain alignment
RV7 (B1) : Video Gain fine-alignment
RV10 (G14) : Color Framing Error Detection alignment (For DVR-28P)
RV11 (J16) : Color Framing alignment
RV12 (G20) : Color Framing Detection Circuit Gain alignment
RV13 (G19) : Color Framing Detection Circuit Offset alignment
RV14 (E13) : Input SC-H alignment
This adjustment is used for SC-H adjustment when INPUT reference selected.
RV15 (B13) : Input Check alignment
This adjustment is used for video level adjustment for input check.
RV16 (C1) : HUE alignment
This adjustment is used for 4fsc fine-adjustment.

RV201 (B2), RV301 (E2), RV401 (J2), RV501 (M2)
: Common Mode Noise Rejection alignment
RV202 (D4) : CH-1 GAIN CONTROL OFFSET NULL
RV302 (E4) : CH-2 GAIN CONTROL OFFSET NULL
RV402 (G4) : CH-3 GAIN CONTROL OFFSET NULL
RV502 (G4) : CH-4 GAIN CONTROL OFFSET NULL
This adjustment is used for UNITY value alignment of audio level control circuit.

RV203 (D4), RV303 (E4), RV403 (G4), RV503 (G4)
: Input Level Variable Range alignment

RV204 (C1), RV304 (F1), RV404 (K1), RV504 (M1)
: VCA THD alignment
RV305 (B5), RV505 (L5)
: Audio Crosstalk Cancel Circuit alignment
RV206 (B3), RV306 (E3), RV406 (G3), RV506 (M3)
: Audio Level Meter alignment
RV207 (B1) : Audio Reference Level CH-1 alignment
RV307 (E1) : Audio Reference Level CH-2 alignment
RV407 (G1) : Audio Reference Level CH-3 alignment
RV507 (K1) : Audio Reference Level CH-4 alignment

The reference levels are set to +8 dB when shipped.
However, they can be changed to 0 through +8 dB by the following steps.
Adjust RV207, RV307, RV407 and RV507 as follows, after JP202, 302, 402 or 502 is selected to the your requested value.

(1) Connect the audio reference level signal (desired signal and level) to ANALOG AUDIO INPUT.
(2) Push the AUDIO IN key on the Menu select keys to select AUDIO IN menu.
(3) Push F1 through F4 (DA-1 through DA-4) on the Function keys.
(4) CH-1 through CH-4 can be adjusted at the same time. Check that the letters under DA-1 through DA-4 are lit on the display. Push the UNITY/VAR button to change the indication to UNITY.
(5) Push F11 (SCALE) key to change the indication of the scale of the audio peak level meter to FINE.
(6) Adjust these variable resistors checking the audio level meter so that the audio level of each channel is indicated as -20 dB (Indication of the reference level within VTR.).

NOTE: Align the LO-14 board for ANALOG AUDIO OUTPUT.

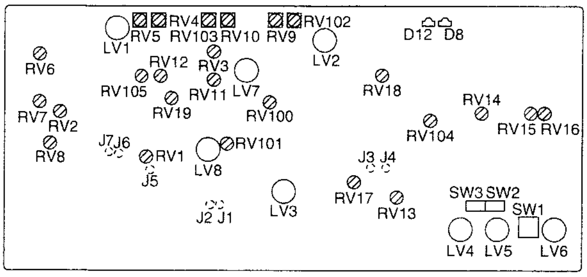
LV2 (C8) : Burst Tuning alignment

Jumpers

JP201, 301, 401, 501
Input terminal..................................600 Ω
JP202, 302, 402, 502
Input level.......................................–20, 0, +4 or +8 dB

AE-15 Board

◎: Not used for DVR-P28 (NTSC)



A SIDE

Indicators

D8 (J1) : CTL indicator (green)
This diode lights when the PB CTL signal level is more than 0.5 Vp-p.

D12 (J1) : TC indicator (green)
This diode lights when the PB TC signal level is more than 0.5 Vp-p.

Jumpers

◎ J1 (E4)/J2 (E4): CUE LINE Input Impedance
The CUE Line Input impedance can be changed as for the following setting (open or short), that is to say, the jumper is soldered or unsoldered. They are set to 600 ohm when shipped.

Jumper	600 ohm (When shipped)	150 ohm	High Impedance
J1	SHORT	SHORT	OPEN
J2	OPEN	SHORT	OPEN

J3 (H4) : CUE LINE Output Level
When shipped, J3 is shorted.
0 to 8 dBm: shorted
–20 dBm: opened (desolder)

J4 (H4) : TC LINE Output Level
When shipped, J4 is shorted.
0.07 to 0.5 dBm: shorted
0.9 to 5.8 dBm : opened (desolder)

◎ J5 (C4) : CUE LINE Input Level
When shipped, J5 is shorted.
0 to 8 dBm: shorted
–20 dBm : opened (desolder)

J6 (C3), J7 (C3) : Shipped area setting
When shipped, J6 is shorted and J7 opened in DVR-28.
When shipped, J6 is opened and J7 shorted in DVR-28P.

Adjustments

◎ RV1 (D3) : CUE LINE Input Level alignment
This level is set to +8 dBm when shipped.
However, it can be changed 0 through +8 dBm or –20 dBm by the following steps.

(1) Connect the desired reference signal and level to ANALOG CUE INPUT.
(2) Put the VTR into the STOP mode, and adjust the level of TP1 to –3 dBs (1.55 Vp-p) with RV1.

◎ RV2 (B3) : CUE UNITY Level alignment
◎ RV3 (E1) : CUE REC Bias Current alignment
◎ RV4 (D1) : CUE REC Level alignment
◎ RV5 (C1) : CUE REC EQ alignment
◎ RV9 (F1) : CTL REC Level alignment
◎ RV10 (E1) : TC REC Level alignment
◎ RV102 (F1) : CTL REC Level (FAST) alignment
◎ RV103 (E1) : TC REC Level (FAST) alignment

These adjustments are used for REC level and equalizer alignments of CUE/TC/CTL channels. Do not touch these adjustments except when it is need to adjust.
For details, refer to Section 11 "CUE/TC/CTL Signal System Alignment."

RV6 (A1) : CUE PB Frequency Characteristic alignment
RV7 (A2) : CUE PB UNITY Level alignment
RV8 (A3) : CUE Level Meter alignment
◎ RV11 (E2) : TC-CTL Crosstalk Canceler Frequency Characteristics alignment
◎ RV12 (D2) : TC-CTL Crosstalk Canceler Level alignment
RV13 (H4) : TC LINE Output Level alignment

These levels are set to +2.4 dBm when shipped. However, they can be changed to 0.07 through 0.5 Vp-p or 0.9 through 5.8 Vp-p by the following alignment.

(1) Press the TC&CHR key on the menu select keys to select TC & CHR menu.
(2) Press the SOURCE key on the function keys to select INT.
(3) Insert the cassette tape.
(4) Put the VTR into the REC mode.
(5) Open or solder the J4 (short slit) so that the TC LINE output level meets the desired level.
(6) Adjust RV13.

◎ RV14 (K2) : CUE Channel Erase Current alignment
◎ RV15 (L2) : TC Channel Erase Current alignment
◎ RV16 (L2) : CTL Channel Erase & Full Erase Current alignment
RV17 (G4) : CUE LINE Output Level alignment

These levels are set to +8 dBm when shipped.
However, they can be changed to 0 through +8 dBm by the following change or alignment.
Connect the reference level signal (desired level signal) to the ANALOG CUE INPUT.
Put the VTR into the STOP mode. Adjust RV17 so that the CUE LINE output level is set to the reference level.

RV18 (H2) : CTL PB Level alignment
◎ RV19 (D2) : TC-CTL Crosstalk Canceler High Frequency Gain alignment
◎ RV100 (F2) : CTL REC Bias Current alignment
◎ RV101 (F3) : TC REC Bias Current alignment
◎ RV104 (J3) : CUE Input VCA Control Level alignment
RV105 (C2) : CUE PB VCA Control Level alignment
◎ LV1 (C1) : CUE REC Bias Current Resonance alignment
◎ LV2 (G1) : CTL REC Bias Current Resonance alignment-2
◎ LV3 (F4) : TC REC Bias Current Resonance alignment
◎ LV4 (K4) : CUE Channel Erase Current Resonance alignment
◎ LV5 (L4) : TC Channel Erase Current Resonance alignment
◎ LV6 (M5) : CTL Channel Erase & Full Erase Current alignment
◎ LV7 (F2) : CTL REC Bias Current Resonance alignment-1
◎ LV8 (E3) : TC REC Bias Current Resonance alignment-1

Switches

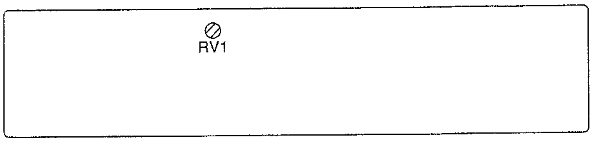
◎ SW1 (L4) : Capacitor Change switch for CTL Channel Erase & Full Erase Current Resonance alignment

This switch can change by 100 PF from 1000 PF to 1500 PF.
When shipped, this switch is set to the suitable position.

◎ SW2 (K4) : Capacitor Change switch for TC Channel Erase Current Resonance alignment
◎ SW3 (K4) : Capacitor Change switch for CUE Channel Erase Resonance alignment

Only channel-2 can be used at 900 PF or 1000 PF.
When shipped, these switches are set to the suitable position.

CT-133 Board

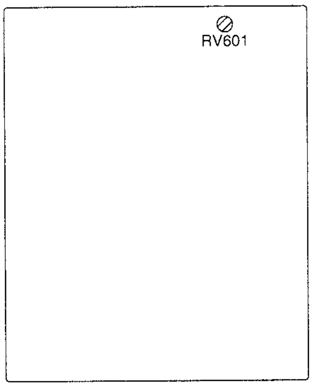


A SIDE

Adjustment

RV1 (B1) : +22V Output Voltage alignment

DD-11 Board

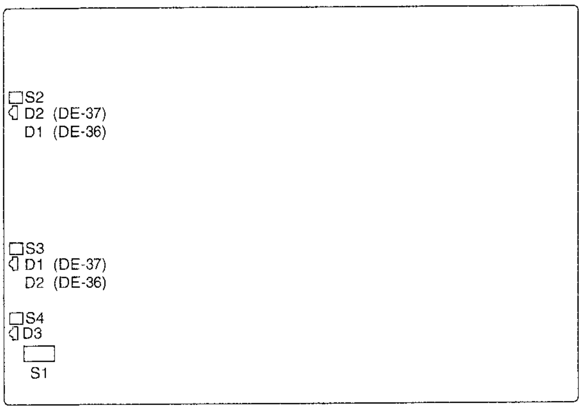


COMPONENT SIDE

Adjustment

RV601 (A3) : DT Drive Voltage alignment

DE-37/DE-36 Board



A SIDE

Indicators

D1 (A17/A7) : Video Outer Correction Off indicator (red)
This indicator lights when the Video Outer Correction ON/OFF switch (S3) in the front of DE board is set to the OFF position.

D2 (A7/A17) : Inner Correction Off indicator (red)
This indicator lights when the Inner Correction ON/OFF switch (S2) in the front of DE board is set to the OFF position.

D3 (A21) : Audio Outer Correction OFF indicator (red)
This indicator lights when the Audio Outer Correction OFF switch (S4) in the front of DE board is set to the OFF position.

Switches

S1-1 (A23) : Jog Audio Sel switch
When JOG and VAR playback, select PB digital audio by whether repeated sound or interpolation sound. When this switch is set to the ON position, the repeated sound can be selected. When this switch is set to the OFF position, the interpolation sound can be selected.
Usually set to the OFF position. When shipped, set to the OFF position.

S1-2 (A23) : Freeze Sel (Shuttle) switch
When the PB signal is no signal in the shuttle play mode, this switch selects whether the frozen picture is output or not.
When this switch is set to the ON position, the frozen picture is output. When this switch is set to the OFF position, the PB signal is output.

S1-3 (A23) : Freeze Sel (Normal) switch
When the PB signal is no signal in the normal play mode, this switch selects whether the frozen picture is output or not.
When this switch is set to the ON position, the PB signal is output. When this switch is set to the OFF position, the frozen picture is output.

S1-4 (A23) : Det Mode switch
Set to the OFF position.

S1-5 (A23), S1-6 (A23) : Not used.

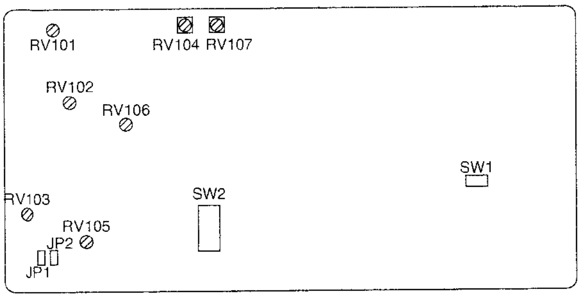
S1-7 (A23) : AC CH RF switch
S1-8 (A23) : BD CH RF switch
This switch selects whether RF data of AC CH or BD CH is used or not. Usually set to the OFF position. When shipped, set to the OFF position.

S2 (A6) : Inner Correction ON/OFF switch
Set to the ON position. When this switch is set to the OFF position, errors are not corrected at the Inner Decoder. In this condition, the Inner Correction OFF indicator (D2) on DE board lights.

S3 (A16) : Video Outer Correction ON/OFF switch
Set to the ON position. When this switch is set to the OFF position, errors are not corrected at the Video Outer Decoder. In this condition, the Video Outer Correction OFF indicator (D1) on DE board lights.

S4 (A21/A20): Audio Outer Correction ON/OFF switch
Set to the ON position. When this switch is set to the OFF position, errors are not corrected at the Audio Outer Decoder. In this condition, the Audio Outer Correction OFF indicator (D3) on DE board lights.

DT-16 Board



COMPONENT SIDE

Adjustments

RV101 (A1) : A/D Converter Reference Voltage alignment
RV102 (B2) : Head A, B Drive Gain alignment
RV106 (B5) : Head C, D Drive Gain alignment
RV103 (D1) : Head A, B Loop Gain alignment
RV105 (D2) : Head C, D Loop Gain alignment
RV104 (A6) : DT Head-1 Displacement Control Voltage alignment
RV107 (A7) : DT Head-2 Displacement Control Voltage alignment

Switches

SW1-1 (C16) : DT A/B Head Tracking Error switch
Set to the ON position. When this switch is set to the OFF position, the track curve error current is set to the OFF position.
When adjusting, this switch should be OFF.

SW1-2 (C16) : DT C/D Head Tracking Error switch
Set to the ON position. When this switch is set to the OFF position, the track curve error current is set to the OFF position.
When adjusting, this switch should be OFF.

SW2-1 (C7) : RF Level Maximize Servo switch
Set to the OFF position. When this switch is set to the ON position , RF level doesn't operate to maximize.

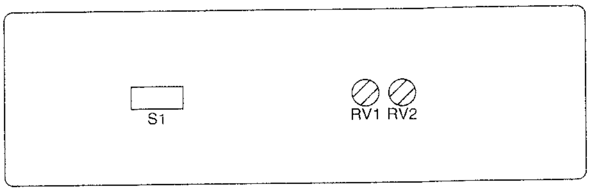
SW2-2 (C7) : RF Sampling Point switch
Set to the OFF position. When this switch is set to the ON position, the RF sampling point changes.

SW2-3 (C7) : DT Active switch
Set to the OFF position. When this switch is set to the ON position, the DT heads (A/B and C/D) are inoperative.

SW2-4 to SW2-8 (C7) : (Factory Use)
Set to the OFF position.

ED-24 Board

Not used for DVR-P28 (NTSC)



A SIDE

Adjustments

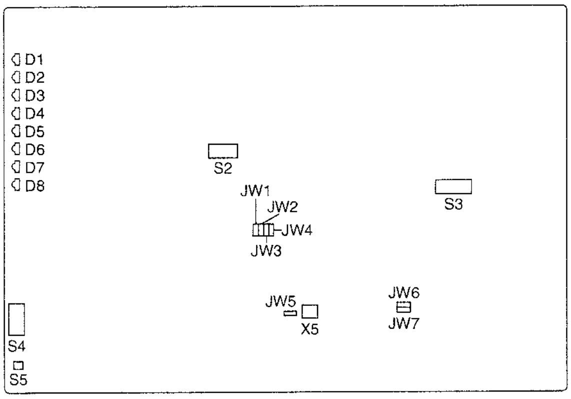
RV1 (D2) : CTL CONFI Level alignment
This switch is used for CTL PB level alignment.
RV2 (D2) : TC CONFI Level alignment
This switch is used for TC PB level alignment.

Switch

S1 (B2) : TC Error Detect Window switch
This switch changes window size for TC error detection to 1/40 frame (OFF) of one frame (ON).
When shipped, set to the ON position.

EN-99 Board

◎: Not used for DVR-P28 (NTSC)



A SIDE

Indicators

D1 (A4) : Reference Video indicator (green)
This indicator lights when the REF Video signal is present.

D2 (A5) : IN Video indicator (green) (DVR-28)
: TEST INPUT indicator (green) (DVR-P28 NTSC)
This indicator lights when the Digital Video input signal (DVR-28)/TEST VIDEO signal (DVR-P28 NTSC) is present.

◎ D3 (A6) : IN A1/2 indicator (green)
This indicator lights when the Digital Audio CH-1/2 signals are present.

◎ D4 (A8) : IN A2 indicator (green)
This indicator lights when the Digital Audio CH-2 signal is present.

◎ D5 (A9) : IN A3/4 indicator (green)
This indicator lights when the Digital Audio CH-3/4 signals are present.

◎ D6 (A10) : IN A4 indicator (green)
This indicator lights when the Digital Audio CH-4 signal is present.

D7 (A11) : Audio Mute indicator (red)
This indicator lights when the audio output is muted when the error rate of the Audio PB data is excessive.

◎ D8 (A12) : Video Level indicator (red)
This indicator lights when the input video signal level exceeds the specified level.

Jumpers

JW1 to JW7, X5:
For DVR-28
JW1 (G16), JW3 (G16), JW5 (H23) and JW6 (M22) are shorted.
JW2 (G16), JW4 (G16), JW7 (M22) and X5 (J22) are opened.
For DVR-28P
JW1, JW3, JW5 and JW6 are opened.
JW2, JW4, JW7 and X5 are shorted.
For DVR-P28 (NTSC)
JW1, JW2, JW4, JW5, JW7 and X5 are opened.
JW3 and JW6 are shorted.

Switches

S2 (F10) : 8P Dip switch
Bit1 : ON → Character Blink Enable
OFF → Character Blink Disable
Bit2 : Reserve
Bit3 : Reserve
Bit4 : Reserve
Bit5 : Reserve
Bit6 : Reserve
Bit7 : ON → JOG/VAR/SHUTTLE Audio -6 dB Out
OFF → SHUTTLE -6 dB Out
Bit8 : Reserve
When shipped, set to the ON position except for Bit7.

◎ S3 (N13) :
This switch detects zero position in digital audio recording.
*zero position = audio recorded position against video frame
When shipped, set as follows:

	Bit1	Bit2	Bit3	Bit4	Bit5	Bit6	Bit7	Bit8	Bit9	Bit10
NTSC	OFF	OFF	OFF	OFF	ON	ON	OFF	ON	OFF	ON
PAL	OFF	OFF	ON	ON	OFF	OFF	ON	OFF	ON	ON

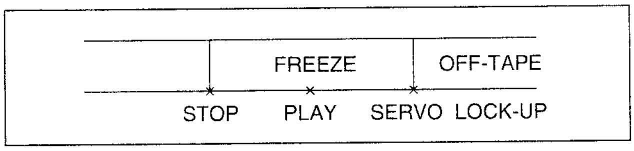
S4 (A23) : 8P Dip switch
S4-1, S4-2 : (Factory Use)
Set to the ON position.
S4-3, S4-4 : RF Test switch
The digital video value is output to the RF boards when the switches are set in combination below.
When shipped, set to the ON position.

Digital Video Value	S4-3	S4-4
(FF)H	OFF	ON
(AA)H	ON	OFF
(BD)H	OFF	OFF

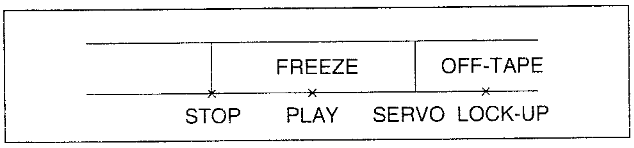
S4-5, S4-6 : Stop Picture Mode Select switch
These switches can be set in combination below.

	S4-5	S4-6
SETTING 1	ON	ON
SETTING 2	ON	OFF
SETTING 3	OFF	OFF

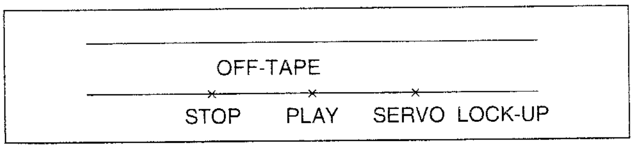
SETTING 1
This setting is used as a factory set-up.
The unit freezes a noise-free picture just before the tape stops and keep displaying it until the next servo lock up.


FREEZE
OFF-TAPE
STOP
PLAY
SERVO LOCK-UP

SETTING 2
The unit freezes a picture, like the factory setting, but continues to renew the picture with OFF-TAPE video as in shuttle mode. The output is free from the picture jumps which occur with the factory setting.


FREEZE
OFF-TAPE
STOP
PLAY
SERVO LOCK-UP

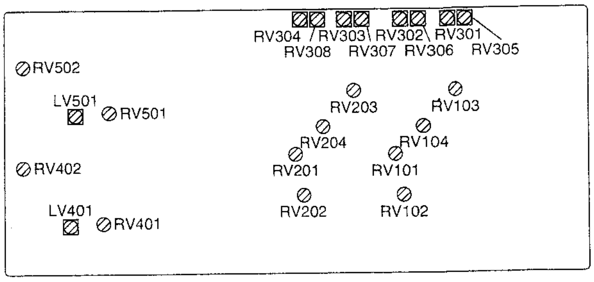
SETTING 3
The OFF TAPE video can be displayed on the monitor.


OFF-TAPE
STOP
PLAY
SERVO LOCK-UP

S4-7, S4-8 : (Factory Use)
Set to the ON position.

S5 (A26) : CPU Reset switch
When this switch is pressed, the CPU on EN-99 board is reset.

EQ-29 Board


RV304
RV303
RV302
RV301
RV308
RV307
RV306
RV305
RV502
LV501
RV501
RV203
RV103
RV204
RV104
RV402
RV201
RV101
RV202
RV102
LV401
RV401

A SIDE

Adjustments

Note: Do not turn the following adjustments except when adjusting.
For details, refer to Section 13 "RF Signal System Alignment."

RV101 (D2), RV201 (C2) : (Factory Use)

RV102 (D2) : A/C-CH RF Envelope Offset alignment
RV202 (C2) : B/D-CH RF Envelope Offset alignment
These adjustments are used for the offset alignment of envelope detection board, RE-41.

RV103 (D1) : A/C-CH RF Switching Offset alignment
RV203 (C1) : B/D-CH RF Switching Offset alignment
These adjustments are used for A/C or B/D level alignment of RF switching.

RV104 (D2), RV204 (C2) : (Factory Use)

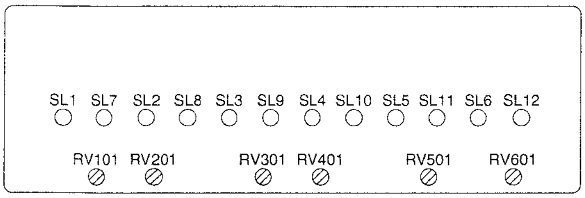
RV301 (D1) : PB EQ A-CH adjustment
RV302 (D1) : PB EQ C-CH adjustment
RV303 (C1) : PB EQ B-CH adjustment
RV304 (C1) : PB EQ D-CH adjustment
RV305 (D1) : PB Phase A-CH adjustment
RV306 (D1) : PB Phase C-CH adjustment
RV307 (C1) : PB Phase B-CH adjustment
RV308 (C1) : PB Phase D-CH adjustment
These adjustments are used for the video PB equalizer adjustment.

RV401 (A3) : PLL A/C Offset alignment
RV501 (A2) : PLL B/D Offset alignment
These adjustments are used for the offset alignment of A/C or B/D channel PLL control signal.

RV402 (A2) : PLL A/C Balance alignment
RV502 (A1) : PLL B/D Balance alignment
These adjustments are used for the free run frequency alignment when no VCO signal of A/C or B/D channel is input.

LV401 (A3) : PLL A/C Frequency alignment
LV501 (A2) : PLL B/D Frequency alignment
These adjustments are used for VCO V-frequency characteristic alignment of A/C or B/D channel.

LO-14 Board



B SIDE

Jumpers

Analog Audio Reference Level Setting
The reference levels are set to +8 dBm when shipped.

Reference Level	0~+8dBm	-20dBm
CH1	SL1/OPEN SL7/OPEN	SL1/SHORT SL7/OPEN
CH2	SL2/OPEN SL8/OPEN	SL2/SHORT SL8/OPEN
CH3	SL3/OPEN SL9/OPEN	SL3/SHORT SL9/OPEN
CH4	SL4/OPEN SL10/OPEN	SL4/SHORT SL10/OPEN
MONITOR LCH	SL5/OPEN SL11/OPEN	SL5/SHORT SL11/OPEN
MONITOR RCH	SL6/OPEN SL12/OPEN	SL6/SHORT SL12/OPEN

Adjustments

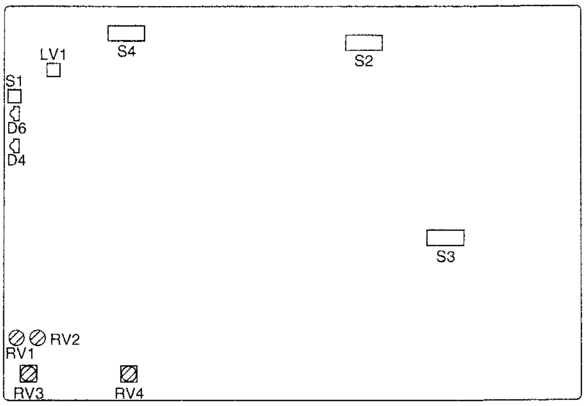
RV101 (A1) : CH-1 alignment
RV201 (B1) : CH-2 alignment
RV301 (C1) : CH-3 alignment
RV401 (D1) : CH-4 alignment
RV501 (E1) : MONITOR L alignment
RV601 (F1) : MONITOR R alignment

These adjustments are used for the PB level alignments of AUDIO CH-1/AUDIO CH-2/AUDIO CH-3/AUDIO CH-4/MONITOR R/MONITOR L channels.

Do not turn these adjustments except when adjusting.

For details, refer to Section 15 "Audio Signal System Alignment."

PR-157 Board



A SIDE

Indicators

D4 (A8) : NO EXT REF indicator (red)
This indicator lights when the REF Video signal is absent.

D6 (A6) : Conceal OFF indicator (red)
This indicator lights when the Video Conceal ON/OFF switch in front of PR-157 board is set to the OFF position.

Adjustments

RV1 (A19) : CF Gain alignment
RV2 (A19) : CF Offset alignment
RV3 (A21) : CF Control alignment
RV4 (D21) : SC Phase alignment

LV1 (B3) : Burst alignment

Switches

S1 (A5) : Video Conceal ON/OFF switch
Set to the ON position. When this switch is set to the OFF position, the video signal error is not concealed. In this condition, the Conceal Off indicator (D6) on PR-157 board lights.

S2-1 to S2-3 (L2) :
These switches are used to select a signal from the video output terminals in the absence of other signal. The factory setting is GRAY LEVEL.

NOTE: Do not set the switches in any combination except for the following settings.

Output Signal	S2-1	S2-2	S2-3
Black Level	OFF	OFF	ON
Gray Level	ON	OFF	OFF
White Level	OFF	OFF	OFF
Noise Pattern ①	OFF	ON	OFF
Noise Pattern ②	ON	ON	OFF

S2-4, S2-10 (L2) : (Factory Use)
Set to the OFF position.
When setting to the ON position, this mode isn't used for field concealment.
When shipped, set as follows:
ON → S2-1, S2-7, S2-8
OFF → S2-2 to S2-6, S2-9, S2-10

S3-1 to S3-10 (P12) : (Factory Use)
Set to the ON position.

S4-1 to S4-3 (D1) : (Factory Use)
Set to the OFF position.

S4-4 : Y/C SEP Mode Switch
ON: Band Pass Filter
OFF: Adaptive Comb Filter
When shipped, set to the OFF position.

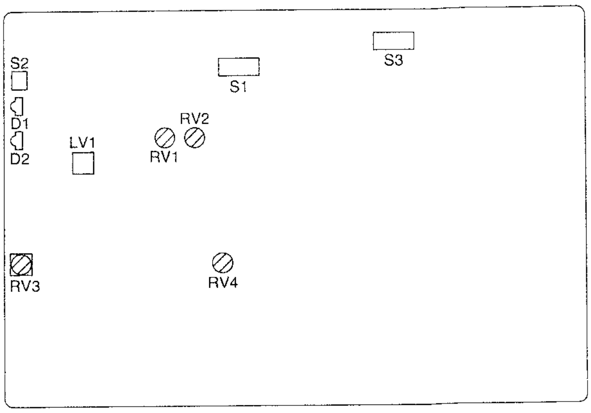
S4-5 : (Factory Use)
Set to the OFF position.

S4-6 : Bar Graph ON/OFF switch when Multi Loop Test
ON: There is no Bar Graph.
OFF: There is Bar Graph.
When shipped, set to the OFF position.

S4-7 : (Factory Use)
Set to the OFF position.

S4-8 : Multi Loop Test External Delay Mode switch
ON: External Delay 2H. DVR-P28 (NTSC) carries out MULTI LOOP using the two units.
OFF: no External Delay. DVR-P28 (NTSC) carries out MULTI LOOP using the one unit.
When shipped, set to the OFF (DVR-28) /ON (DVR-P28 NTSC) position.

PR-163 Board



A SIDE

Indicators

D1 (A7) : Conceal OFF indicator (red)
This indicator lights when the Video Conceal ON/OFF switch in front of PR-163 board is set to the OFF position.

D2 (A9) : NO EXT REF indicator (red)
This indicator lights when the REF Video signal is absent.

Adjustments

RV1 (A19) : CF Gain alignment
RV2 (A19) : CF Offset alignment
RV3 (A21) : CF Control alignment
RV4 (D21) : SC Phase alignment

LV1 (B3) : Burst alignment

Switches

S1-1 to S1-3 (J5) :
These switches are used to select a signal from the video output terminals in the absence of other signal. The factory setting is GRAY LEVEL.

NOTE: Do not set the switches in any combination except for the following settings.

Output Signal	S1-1	S1-2	S1-3
Black Level	ON	OFF	OFF
Gray Level	OFF	ON	OFF
Noise Pattern	OFF	OFF	ON

S1-4 to S1-6 (J5) : (Factory Use)
Set to the OFF position.

S1-7 (J5) :

Y/C Separate Mode	S1-7
Band Pass Mode	ON
Adaptive Y/C Separate Mode	OFF

(Factory Setting is the OFF position.)

S1-8, S1-9 (J5) : (Factory Use)
Set to the OFF position.

S1-10 (H4) : Field Concealment Inhibit switch
Factory setting is the OFF position.
When this switch is set to the ON position, this switch inhibits to be preformed field concealment.

S2 (A6) : Video Conceal ON/OFF switch
Set to the ON position. When this switch is set to the OFF position, the video signal error is not concealed. In this condition, the Conceal Off indicator (D1) on PR-163 board lights.

S3-1 to S3-5 (Q2) : (Factory Use)
Set to the OFF position except S3-3. (S3-3 is set to the on position.)

S3-6 : Bar Graph ON/OFF switch when Multi Loop Test
ON: There is no Bar Graph.
OFF: There is Bar Graph.
When shipped, set to the OFF position.

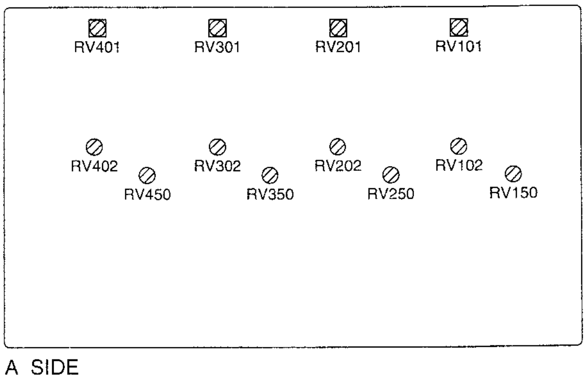
S3-7 : Multi Loop Test External Delay Mode switch
ON: External Delay 2 Line
OFF: except External Delay 2 Line
When shipped, set to the OFF position.

S3-8 : (Factory Use)
Set to the OFF position.

REC-11 Board

Printed Circuit Board (–11)
S/N 10001 to 10599: DVR-28 (UC)
S/N 10001 to 10499: DVR-28P (EK, UC)

Not used for DVR-P28 (NTSC)



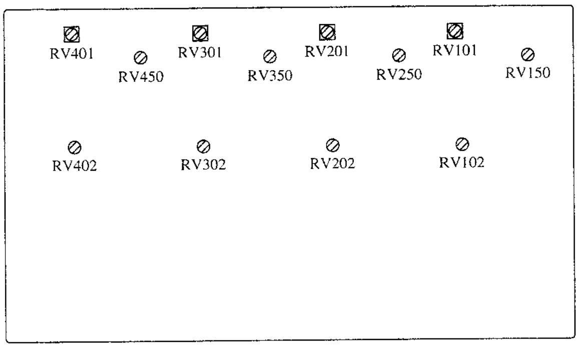
Adjustments

RV101 (E1) : CH-A REC Current Frequency Characteristic alignment
RV201 (D1) : CH-C REC Current Frequency Characteristic alignment
RV301 (C1) : CH-B REC Current Frequency Characteristic alignment
RV401 (B1) : CH-D REC Current Frequency Characteristic alignment
RV102 (E2) : CH-A REC Current Secondary Distortion alignment
RV202 (D2) : CH-C REC Current Secondary Distortion alignment
RV302 (C2) : CH-B REC Current Secondary Distortion alignment
RV402 (B2) : CH-D REC Current Secondary Distortion alignment
RV150 (E3) : CH-A REC Head PB Envelope Gain alignment
RV250 (D3) : CH-C REC Head PB Envelope Gain alignment
RV350 (C3) : CH-B REC Head PB Envelope Gain alignment
RV450 (B3) : CH-D REC Head PB Envelope Gain alignment

REC-11 Board

Printed Circuit Board (–12)
S/N 10601 and higher: DVR-28 (UC)
S/N 10501 and higher: DVR-28P (EK, UC)

Not used for DVR-P28 (NTSC)

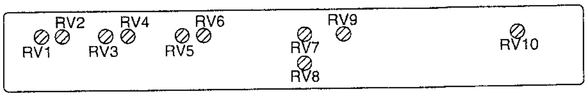


A SIDE

Adjustments

RV101 (E1) : CH-A REC Current Frequency Characteristic alignment
RV201 (D1) : CH-C REC Current Frequency Characteristic alignment
RV301 (C1) : CH-B REC Current Frequency Characteristic alignment
RV401 (B1) : CH-D REC Current Frequency Characteristic alignment
RV102 (E2) : CH-A REC Current Secondary Distortion alignment
RV202 (D2) : CH-C REC Current Secondary Distortion alignment
RV302 (C2) : CH-B REC Current Secondary Distortion alignment
RV402 (B2) : CH-D REC Current Secondary Distortion alignment
RV150 (E1) : CH-A REC Head PB Envelope Gain alignment
RV250 (D1) : CH-C REC Head PB Envelope Gain alignment
RV350 (C1) : CH-B REC Head PB Envelope Gain alignment
RV450 (B1) : CH-D REC Head PB Envelope Gain alignment

RE-52 Board

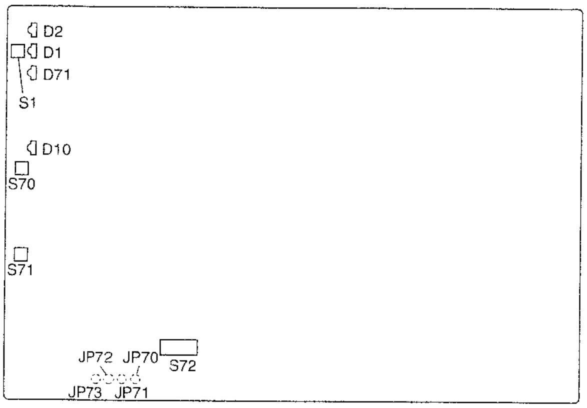


COMPONENT SIDE

Adjustments

RV1 (H1), RV3 (F1), RV5 (F1)
: Series Regulator Voltage alignment
RV2 (G1) : Series Regulator Current Limiter alignment (+12V)
RV4 (F1) : Series Regulator Current Limiter alignment (-12V)
RV6 (E1) : Series Regulator Current Limiter alignment (-5V)
RV7 (D2), RV8 (E1), RV9 (D1)
: +5V Voltage alignment (+14V)
RV10 (A1) : Motor System Output Voltage alignment (+14V)

SSP-07 Board



A SIDE

Indicator

D1 (A2) : LTC Read indicator (green)
This indicator lights when the longitudinal time code data (LTC) is played back properly.

D2 (A2) : NON DF indicator (red)
This indicator lights when the unit is set to the non-drop frame mode (F5: DF MD OFF) on the TC & CHR menu.
This indicator has the following two functions.

1) This indicator lights until the power is OFF when the Read write error of NOVRAM on SSP-07 board is occurs or the CPU error on SSP-07 board occurs.
   At this time, the system does not start to operate normally.
2) If S1 (SET UP switch) is pressed while the power is turned ON or the CPU reset switch (S70) on SSP-07 board is pressed, this indicator lights. (Refer to the explanation of S1 setting.)

D10 (A6) : SU Test indicator (green)
Usually this indicator lights.
It blinks when reset, any trouble for RAM test or ROM checksum error.

D71 (A2) : CPU Watch Dog Timer indicator (red)
This diode lights when a CPU error occurs. At this time, it doesn't operate by operating the safety function.

Jumpers

JP70 (D17) to JP73 (C17)
: The hard version of SSP-07 board is shown.
When shipped, these jumpers are shorted.

Switches

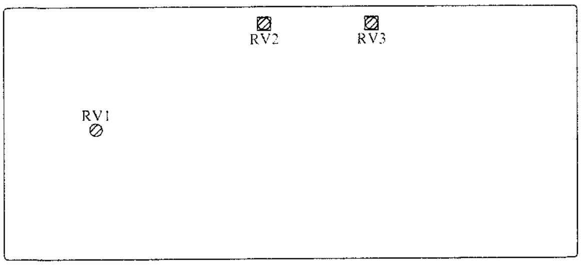
S1 (A2) : SET UP switch
If this switch is pressed while the power is turned ON or the CPU reset switch (S70) on SSP-07 board is pressed, all of the system control parameters except for the control panel are set to the initial setting.

S70 (A7) : CPU Reset switch
This switch resets all the CPUs of SSP-07 board to the power ON status.

S71 (A11) : NOVRAM WRITE switch
This switch is used for modifying the NOVRAM data on DM-63 board.
For details, refer to Section 3-4 "Checker Menu."

S72 (E16) :
Bit 1: System Hold switch
When setting to the ON position, all current supply to motors and solenoids is stopped. Usually set to the OFF position. When shipped, set to the OFF position.
Bit 2: CASSETTE COMPARTMENT ON/OFF switch
This switch is used for TTP adjustment to remove the cassette compartment.
When this switch is set to the ON position, TTP adjustment without the cassette compartment can perform.
In this condition, LOAD/UNLOAD operation is inhibited and TTP operation using TEST mode can perform.
Usually set to the OFF position.
When shipped, set to the OFF position.
Bit 3 and 4: Not used
When shipped, set to the OFF position.

VM-05 Board



COMPONENT SIDE

Adjustments

RV1 (B3)	:	Video Output Frequency Characteristic alignment
RV2 (D1)	:	Video Output Offset Level alignment
RV3 (F1)	:	Video Output Level alignment

1-10. RACK-MOUNTING

The unit can be mounted in a 19-inch standard rack.
In this case, use rack mount rail, RMM-18DV, optional accessory.

NOTE when mounting:

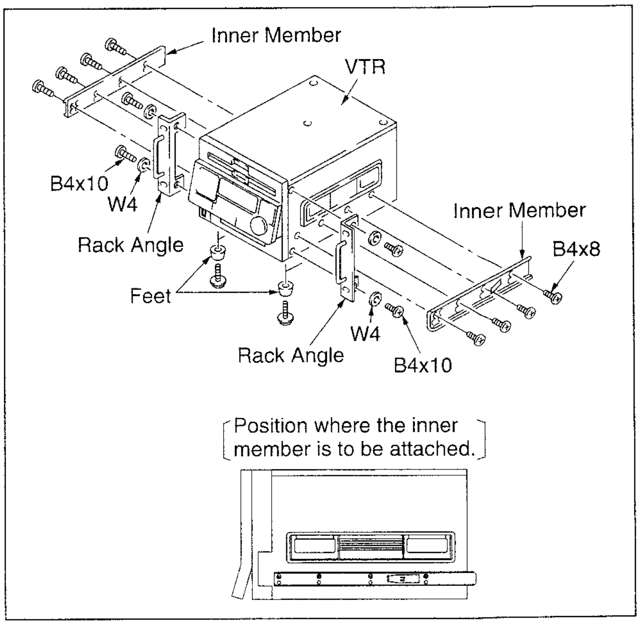
(1) When several units are mounted in a rack, it is recommended that a fan is installed for ventilation. Good air circulation is essential to prevent internal heat built-up in a rack (5 °C to 40°C must be met for all units.)

(2) Do not remove the top panels and the bottom panel during rack mounting.

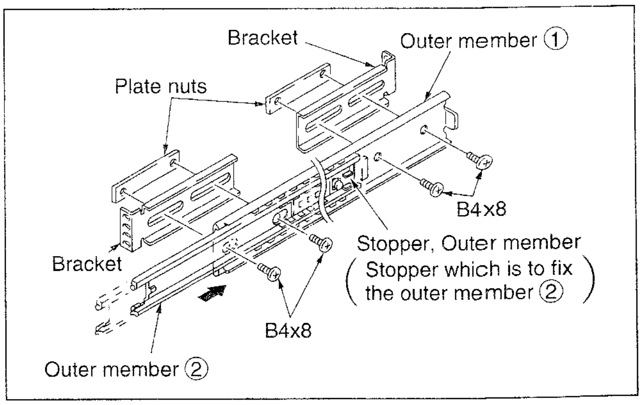
(3) Be sure to secure the rack to the floor to avoid accidents when the unit is pulled out.

Attaching:

(1) Attach the rack angles and inner members.
Attach the rack angles using the four screws (B4x10) and the four washers (W4) which secured the panels.
Remove the feet from the unit if necessary.


Inner Member
VTR
B4x10
W4
Rack Angle
Feet
Inner Member
B4x8
W4
Rack Angle
B4x10
Position where the inner member is to be attached.

(2) Slide the outer member ② so that the screw holes can be seen.
Mount the bracket to the outer member ① temporarily with screws (B4x8) and plate nuts (long).


Bracket
Outer member ①
Plate nuts
B4x8
Stopper, Outer member
(Stopper which is to fix the outer member ②)
Bracket
B4x8
Outer member ②

(3) Mount the outer member ass'y to the rack temporarily with screws (C4x12), washers (W4), and plate nuts (small).
Adjust the outer member position to meet the specification as shown in the figure.
After adjustment, tighten the screws (B4x8) which were tightened temporarily in Step 2.

<Universal Type>

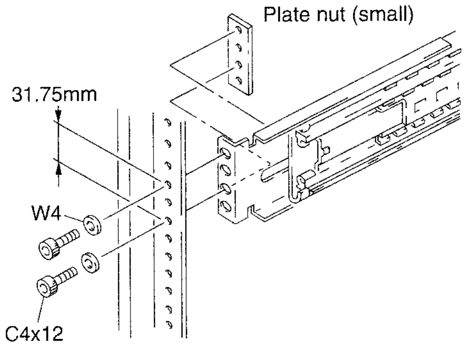


Plate nut (small)
31.75mm
W4
C4x12

<Wide Type>

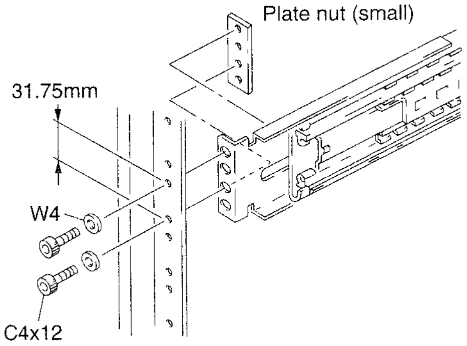
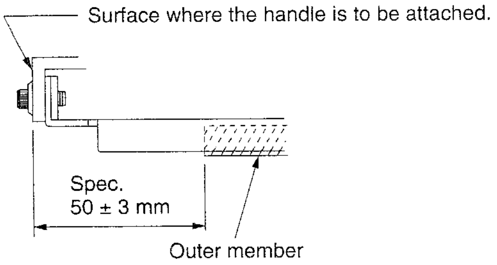
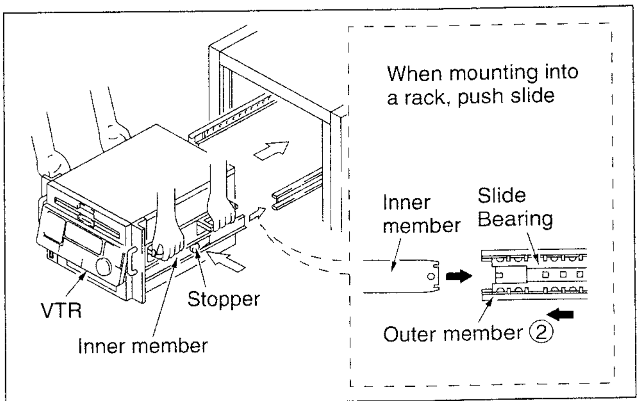


Plate nut (small)
31.75mm
W4
C4x12

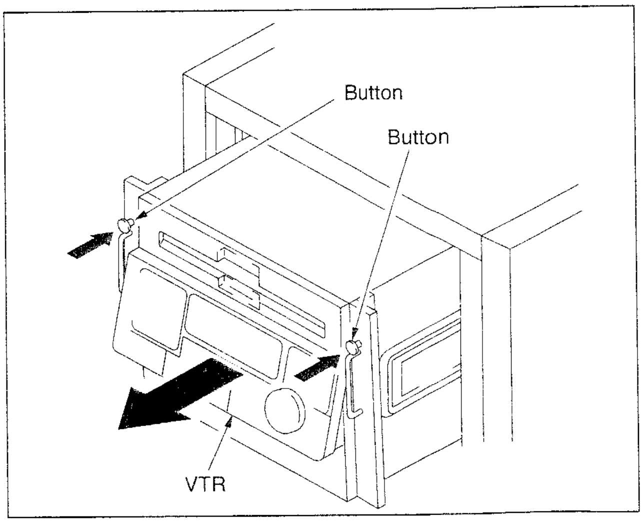

Surface where the handle is to be attached.
Spec.
50 ± 3 mm
Outer member

(4) When mounting into a rack, release the stoppers. Mount the unit and tighten the screw which was tightened temporarily in Step 3 after checking that the VTR slides smoothly.

(5) Push the VTR into the rack tightly so as to be locked automatically.

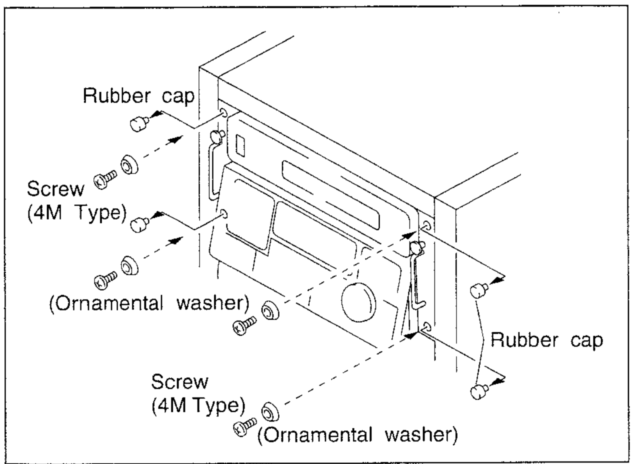

When mounting into a rack, push slide
Inner member
Slide Bearing
Outer member ②
VTR
Stopper
Inner member

(6) When removing from the rack, pull the VTR in the direction of the arrow pushing the button as shown in the figure.


Button
Button
VTR

Fixing:

If the unit is mounted in the 19-inch rack with screws, remove four rubber cap installing on right and left rack angles and fix with M4 type screws.


Rubber cap
Screw
(4M Type)
(Ornamental washer)
Rubber cap
Screw
(4M Type)
(Ornamental washer)

Note When Mounting One-push L Angle:

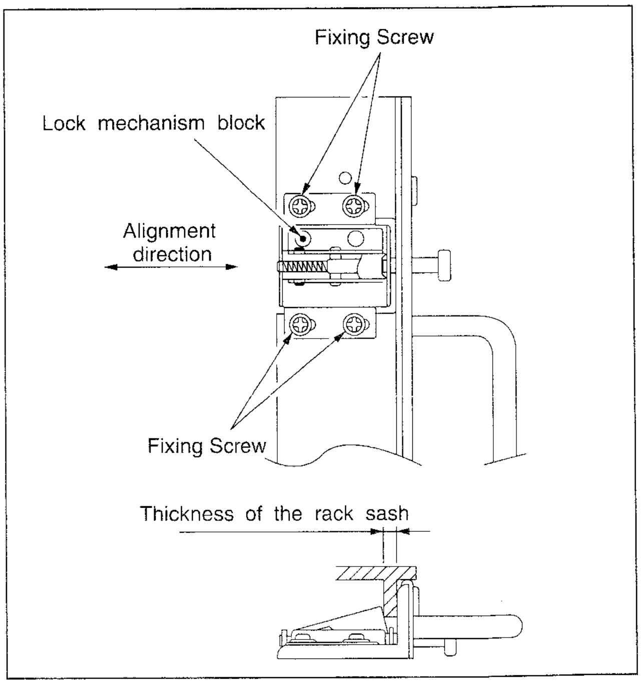
There are a few cases where the play occurs back and forth in lock state when one-push rack L angle is mounted in a 19-inch standard rack.
Adjust the position of the lock mechanism block as the following procedures.

(1) Release the lock state and pull the VTR from the 19-inch rack so as to see lock block.

(2) Loosen the four screws fixing the lock mechanism block.

(3) Move the lock mechanism block by required length and fix the four loosen screws.

(4) Set the lock state again, and confirm whether the alignment has finished or not.


Fixing Screw
Lock mechanism block
Alignment direction
Fixing Screw
Thickness of the rack sash

SECTION 2
SERVICE INFORMATION

2-1. SPECIFICATIONS

DVR-28/P28 (NTSC)

General

Power requirements	Model for the USA and Canada: 100 to 120 V AC ± 10%, 50/60 Hz
Power consumption	Model for the USA and Canada: 800 VA (DVR-28) Model for the USA and Canada: 620 VA (DVR-P28 NTSC)
Operating conditions	Temperature: 5°C to 40 °C Humidity: 10% to 90% (no condensation) Position: Horizontal (max. 10°C inclination)
Weight	About 65 kg (including control panel)
Dimensions	436(W)x370(H)x656(D) mm (including control panel and rubber feet)
Recording/Playback format (DVR-P28 NTSC is a only Playback model.)	SMPTE D-2 format
Tracks/channels	Digital video and audio (4 channels): 6 tracks/1 field Analog audio (cue channel): 1 track Time code: 1 track CTL: 1 track
Tape speed	131.7 mm/sec.
Writing/Reading speed (relative speed)	27.387 m/sec.
Recording/Playback time	L-size cassette :208 minutes max. M-size cassette: 94 minutes max. S-size cassette : 32 minutes max.
Cassette type	D-2 cassette (M, S and L)
Recommended tape	Sony metal tape (1500 Oe) or equivalent
Servo lock time	Within 0.5 sec. (from standby mode to color capstan servo lock mode)
Tape timer accuracy	±2 frames (with continuous CTL signal)
Edit accuracy	0 frame (with time code)
Error correction	Correction and concealment (Reed-solomon code)
Shuttle speed (picture search possible)	Max. ±100 times normal speed
Fast forward/rewind time	D2L-208M : Within 150 sec. D2M-94M : Within 75 sec. D2S-32M : Within 40 sec.
Shuttle acceleration	13 m/ sec^2

DVR-28/P28 (NTSC)

Video

Sampling frequency	14.3 MHz
Quantization	8 bits/I, Q axis sampling
Channel coding	M^2
Video bandwidth	0 to 5.5 MHz ± 0.3 dB, 6 MHz + 0 dB/-2 dB
S/N ratio	54 dB
Differential gain	Less than 2%
Differential phase	Less than 1°
Moire	0
Y/C delay	Less than 10 ns.
Tilt (horizontal and vertical)	Less than 1 %
Low frequency linearity	Less than 2 %
Transient response kell factor (2T pulse)	Less than 1 %
SCH output phase	Based upon RS-170A
Adjustable input level range (Not used for DVR-P28 NTSC)	±3 dB (analog input only)
Adjustable output range	Video gain: −∞ to +3 dB (factory setting) or ±3 dB Chroma gain: −∞ to +3 dB (factory setting) or ±3 dB Hue: ±15° Setup: ±15 IRE Video phase: ±560 ns. (280 ns=SC CYCLE/step) System phase: +3 to -1 μsec. Fine: 0.27 ns/step Coarse: 280 ns/step Subcarrier phase: 360°, 0.35° /step

Digital Audio (DA 1 to DA 4 channels)

Sampling frequency	48 kHz (synchronized to video)
Quantization	20 bits/sample
Frequency response	20 Hz to 20 kHz +0.5 dB/-1.0 dB
Dynamic range	More than 105 dB (at 1 kHz, emphasis ON)
Distortion	Less than 0.02% (at 1 kHz, emphasis ON, operating level)
Crosstalk	Less than -95dB (at 1 kHz, between any two channels)
Wow & flutter	Below measurement limit
Headroom	20 dB
Operating level	+8, +4, 0, −20 dBm adjustable (factory setting: +8 dBm)
Emphasis	T_1 = 50 μsec./ T_2 = 15 μsec. (ON/OFF selectable)
Adjustable input/output level range (DVR-P28 NTSC has only the output it.)	−∞ to +12 dB

Analog audio (Cue track)

Frequency response	100 Hz to 12 kHz ± 3 dB
S/N ratio	Better than 50 dB(at 3% distortion)
Distortion	Less than 3% (at 1 kHz, operating level)
Wow & flutter	Less than 0.2% (0.5 to 200 Hz, NAB unweighted)
Operating level	+8, +4, 0, −20 dBm adjustable (factory setting: +8 dBm)
Adjustable input/output level range (DVR-P28 NTSC has only the output it.)	−∞ to +6 dB

DVR-28/P28 (NTSC)

Input/Output Signal

Video Input	
Analog (DVR-28)	1.0 ±0.3 Vp-p, 75 ohms
Digital (DVR-28)	Parallel interface: SMPTE T14.224/082A format
Test input (DVR-P28 NTSC)	Serial V/A interface (DVR-28): 0.8 Vp-p, 75 ohms, SMPTE T14. 224x2131D
Reference	Composite signal (black burst) Sync and burst: 0.3 Vp-p, 75 ohms
Video Output	
Analog	ANALOG VIDEO-1/2 OUTPUT: 1.0 Vp-p, 75 ohms ANALOG VIDEO-3 OUTPUT: 1.0 Vp-p, 75 ohms/Composite/non-composite switchable CHARACTER OUTPUT: 1.0 Vp-p, 75 ohms MONITOR OUTPUT: 1.0 Vp-p, 75 ohms
Digital	Parallel interface: SMPTE T14.224/082A format Serial V/A interface: 0.8 Vp-p, 75 ohms, SMPTE T14.224x2131D
Audio Input (Not used for DVR-P28 NTSC)	
Analog	CH1, CH2,.CH3, CH4: +28 dBm max. (+8 dBm normal), 150 ohm/600 ohm/HIGH impedance (switchable)
Digital	CH1, CH2, CH3, CH4: AES/EBU format Serial V/A: 0.8 Vp-p, 75 ohm, SMPTE T14.224x2131 D (video & audio)
Cue channel	LINE input: +18 dBm max. (+8 dBm normal), 150 ohm/600 ohm/HIGH impedance (switchable) MIC Input: –44 dBm max.(–60 dBm normal), high impedance
Audio Output	
Analog	CH1, CH2, CH3, CH4: +28 dBm max. (+8 dBm normal)
Digital	CH1, CH2, CH3, CH4: AES/EBU format Serial V/A: 0.8 Vp-p, 75 ohms, SMPTE T14.224x2131D (video & audio)
Cue channel	CUE: +18 dBm max. (+8 dBm normal), low impedance
Monitor output	MONITOR L/R: +28 dBm max. (+8 dBm normal), low impedance
Headphones output level	Variable (adjustable with VR control)
Others	CF PULSE INPUT/OUTPUT: TTL level WFM OUTPUT: 1.0 Vp-p, 75 ohms Video/CTL/RF envelope (A/C, B/D all channels) selectable
Time code	
Input (Not used for DVR-P20 NTSC)	2.4 V ±1.4 Vp-p, 10 k ohms
Output	2.4 Vp-p, low impedance

Design and specifications are subject to change without notice.

DVR-28P

General

Power requirements	Model for the USA and Canada: 100 to 120 V AC ± 10%, 50/60 Hz Model for European countries: 220 to 230 V AC (or 240 V AC adjustable by Sony personnel), 50/60 Hz Model for the United Kingdom: 240 V AC (or 220 V AC adjustable by Sony personnel), 50/60 Hz
Power consumption	Model for the USA and Canada: 800 VA Model for European countries and the United Kingdom: 950 VA
Operating conditions	Temperature: 5°C to 40 °C Humidity: 10% to 90% (no condensation) Position: Horizontal (max. 10°C inclination)
Weight	60 kg
Dimensions	436(W)x370(H)x656(D) mm (including control panel and rubber feet)
Recording format	D-2 format
Tracks/channels	Digital video and audio (4 channels): 6 tracks/1 field Analog audio (cue channel): 1 track Time code: 1 track CTL: 1 track
Tape speed	131.7 mm/sec.
Writing speed (relative speed)	27.387 m/sec.
Recording time	L-size cassette :208 minutes max. M-size cassette: 94 minutes max. S-size cassette : 32 minutes max.
Cassette type	D-1 cassette (M, S)
Recommended tape	Sony metal tape (1500 Oe) or equivalent
Servo lock time	Within 0.5 sec. (from standby mode to color capstan servo lock mode)
Tape timer accuracy	±2 frames (with continuous CTL signal)
Edit accuracy	0 frame (with time code)
Error correction	Correction and concealment (Reed-solomon code)
Shuttle speed (picture search possible)	Max. ±100 times normal speed
Fast forward/rewind time	D2L-208M : Within 150 sec. D2M-94M : Within 75 sec. D2S-32M : Within 40 sec.
Shuttle acceleration	13 m/ sec^2

DVR-28P

Video

Sampling frequency	17.7 MHz
Quantization	8 bits/±135° axis sampling
Channel coding	M^2
Video bandwidth	0 to 6.0 MHz ± 0.3 dB, 6.5 MHz + 0 dB/–3 dB
S/N ratio	54 dB
Differential gain	Less than 2%
Differential phase	Less than 1°
Moire	0
Y/C delay	Less than 10 ns.
Tilt (horizontal and vertical)	Less than 1 %
Low frequency linearity	Less than 2 %
Transient response kell factor (2T pulse)	Less than 1 %
SCH output phase	Based upon CCIR Report 624-3
Adjustable input level range	±3 dB (analog input only)
Adjustable output range	Video gain: –∞ to +3 dB (factory setting) or ±3 dB Chroma gain: –∞ to +3 dB (factory setting) or ±3 dB Burst/chroma phase: ±15° Black level: ±100 mV Video phase: ±450 ns. (225 ns=SC CYCLE/step) System phase: +3 to –1 µsec. Fine: 0.27 ns/step Coarse: 280 ns/step Subcarrier phase: 360°, 0.35° /step

Digital Audio (DA 1 to DA 4 channels)

Sampling frequency	48 kHz (synchronized to video)
Quantization	20 bits/sample
Frequency response	20 Hz to 20 kHz +0.5 dB/-1.0 dB
Dynamic range	More than 105 dB (at 1 kHz, emphasis ON)
Distortion	Less than 0.02% (at 1 kHz, emphasis ON, operating level)
Crosstalk	Less than -95dB (at 1 kHz, between any two channels)
Wow & flutter	Below measurement limit
Headroom	20 dB
Operating level	+8, +4, 0, –20 dBm adjustable (factory setting: +8 dBm)
Emphasis	T_1 = 50 µsec./ T_2 = 15 µsec. (ON/OFF selectable)
Adjustable input/output level range	–∞ to +12 dB

Analog audio (Cue track)

Frequency response	100 Hz to 12 kHz ± 3 dB
S/N ratio	Better than 50 dB(at 3% distortion)
Distortion	Less than 3% (at 1 kHz, operating level)
Wow & flutter	Less than 0.2% (0.5 to 200 Hz, NAB unweighted)
Operating level	+8, +4, 0, –20 dBm adjustable (factory setting: +8 dBm)
Adjustable input/output level range	–∞ to +6 dB

DVR-28P

Input/Output Signal

Video Input	
Analog	1.0 ±0.3 Vp-p, 75 ohms
Digital	Parallel interface: ECL balanced Serial V/A interface: 0.8 Vp-p, 75 ohms
Reference	Composite signal (black burst) Sync and burst: 0.3 Vp-p, 75 ohms
Video Output	
Analog	ANALOG VIDEO-1/2 OUTPUT: 1.0 Vp-p, 75 ohms ANALOG VIDEO-3 OUTPUT: 1.0 Vp-p, 75 ohms/Composite/non-composite switchable CHARACTER OUTPUT: 1.0 Vp-p, 75 ohms MONITOR OUTPUT: 1.0 Vp-p, 75 ohms
Digital	Parallel interface: ECL balanced Serial V/A interface: 0.8 Vp-p, 75 ohms
Audio Input	
Analog	CH1, CH2,.CH3, CH4: +28 dBm max. (+8 dBm normal), 150 ohm/600 ohm/HIGH impedance (switchable)
Digital	CH1, CH2, CH3, CH4: AES/EBU format Serial V/A: 0.8 Vp-p, 75 ohm
Cue channel	LINE input: +18 dBm max. (+8 dBm normal), 150 ohm/600 ohm/HIGH impedance (switchable) MIC Input: −44 dBm max.(−60 dBm normal), high impedance
Audio Output	
Analog	CH1, CH2, CH3, CH4: +28 dBm max. (+8 dBm normal)
Digital	CH1, CH2, CH3, CH4: AES/EBU format Serial V/A: 0.8 Vp-p, 75 ohms
Cue channel	CUE: +18 dBm max. (+8 dBm normal), low impedance
Monitor output	MONITOR L/R: +28 dBm max. (+8 dBm normal), low impedance
Headphones output level	Variable (adjustable with VR control)
Others	CF PULSE INPUT/OUTPUT: TTL level WFM OUTPUT: 1.0 Vp-p, 75 ohms Video/CTL/RF envelope (A/C, B/D all channels) selectable
Time code	
Input	2.4 V ±1.4 Vp-p, 10 k ohms
Output	2.4 Vp-p, low impedance

Design and specifications are subject to change without notice.

2-2. PRINTED CIRCUIT BOARD FUNCTION

This table shows the contents of DVR-28 and DVR-28P.
For DVR-P28 (NTSC), refer to the only table for DVR-P28 (NTSC).

① The board without (N) or (P) is used in both NTSC and PAL models.
② "SP CODE" means Supply code.
③ "PCB" in SP CODE column means Printed Circuit Board.
"MCB" in SP CODE column means Mounted Circuit Board.

BLOCK	BOARD	CIRCUIT FUNCTION	LOCATION	SP CODE
PROCESSOR	AD-73 (N)	Audio A/D, D/A Converter, Video A/D Converter	Card Rack ①	O(MCB)
	AD-73 (P)			O(MCB)
	DF-48×3	IC Exchange Board (Included in AD-73 Board) **Note: 1**		O(PCB)
	EN-99 (N)	Video/Audio Shuffling, Outer/Inner Encoder, Channel Encoder		O(MCB)
	EN-99 (P)			O(MCB)
	DE-37 (N)	Inner/Outer Decoder, Audio Error Concealment, Video/Audio Deshuffling		O(MCB)
	DE-36 (P)			O(MCB)
	PR-157 (N)	Video Error Concealment, Signal Processor		O(MCB)
	PR-163 (P)			O(MCB)
	DIF-05 (N)	〔Option〕 Serial Interface		U
	DIF-05P (P)			U
	PP-34	〔Option〕 Program Play		U
SYSTEM CONTROL & SERVO CONTROL	SSP-07	System Control Reel, Capstan, Drum Servo Control Servo Sub Control	Card Rack ①	O(MCB)
RF	EQ-29 (N)	PB EQ Amplifier, Channel Decoder	Card Rack ②	O(MCB)
	EQ-29 (P)			O(MCB)
	RE-41 ×2	Included in EQ-29 Board		O(MCB)
LONGITUDE	AE-15 (N)	CUE, TC, CTL REC/PB Amp	Card Rack ②	O(MCB)
	AE-15 (P)			O(MCB)
DT CONTROL	DT-16 (N)	Dynamic Tracking Control	Card Rack ②	O(MCB)
	DT-16 (P)			O(MCB)
	DF-45	Included in DT-16 Board		O(MCB)

Note: 1 This Board is used for S/N 10001 through 10899 (J)
This Board is used for S/N 10001 through 10699 (UC)
This Board is used for S/N 10001 through 10599 (PAL)

BLOCK	BOARD	CIRCUIT FUNCTION	LOCATION	SP CODE
HEAD DRUM	DR-132	PB Amplifier	Drum (Inner)	O(MCB)
DDH-26A (N) DDH-27A (P)	DR-135 ×2	REC, DT Head Relay	Drum (Inner) DDR-26(N) DDR-27(P)	U Inner Drum:s
	DR-136 ×2	Erase Head Relay		U
	DR-175 ×2	PB Head Relay		U
	DR-152	REC, PB Head Relay	Drum (Lower)	U Drum Ass'y:s
	DR-134	REC, PB Head Rotary Transformer Relay	→(Flange)	U
	DR-137 ×2	Erase Head Rotary Transformer Relay	→(Flange)	U
	DR-151	Erase Head Relay	→(Outer stator)	U
	DR-133	Brush Slip Ring Relay	Drum (Lower) Brush Slip Ring Ass'y	U Brush Slip Ring Ass'y:s
	DR-159	Brush Relay (Flexible)		U
OTHERS	REC-11 (N)	REC Amplifier	Upper	O(MCB)
	REC-11 (P)			O(MCB)
	RE-83 ×4	Included in REC-11 Board **Note: 2**		O(MCB)
	DM-63	NOVRAM Timer		O(MCB)
	MD-62	Motor Driver	Left Side	O(MCB)
	PD-53 (28)	Pinch Sub Solenoid Driver		O(MCB)
	DD-11	DT Driver		O(PCB)
	UC-2	Ultra Sonic Guide Control	USE (Ultra Sonic & ED) Ass'y	O(MCB)
	ED-24 (N)	Error Detector		O(MCB)
	ED-24 (P)			O(MCB)
	IF-331	Parallel I/O, RS422, GPIB, RS232C	Connector Panel (Remote)	O(MCB)
	VM-05 (N)	Video D/A Converter	Upper	O(MCB)
	VM-05 (P)			O(MCB)
	LO-14	Audio Line Amplifier	Rear	O(MCB)

Note: 2 This Board is used for S/N 10001 through 10999 (J)
This Board is used for S/N 10001 through 10899 (UC)
This Board is used for S/N 10001 through 10799 (PAL)

BLOCK	BOARD	CIRCUIT FUNCTION	LOCATION	SP CODE
POWER SUPPLY	PS-256	Power Supply	Power Supply (Left Side)	O(MCB)
	FU-53	Fuse Board (Included in PS-256 Board)		O(PCB)
	RE-52	Switching Regulator		O(MCB)
	CT-133	Regulator Control		O(MCB)
MOTHER BOARD	MB-378	RF/Longitude/DT Mother	Card Rack ②	O(MCB)
	MB-379	Processor Board System/Servo Mother	Card Rack ①	O(MCB)
FRAME <CASSETTE COMPARTMENT> <SENSOR>	PC-50 PC-51 PC-52	Inner Motor, Cassette Sensor Relay	Cassette Compartment Ass'y	U U U
	PC-53	Cassette In/M Size Sensor		U
	PC-54 ×2	Inner Up, Outer Down Sensor		U
	PC-55 ×4	Inner Down, Cassette L Size, Outer Up/Mid Sensor		U
	PC-42 ×5	User Center (S) (M) (L) User T/S Sensor	S/T Reel Table Ass'y	O(PCB)
	LE-62 TR-43	Tape Thick, Tape HC, REC Inhibit Sensor	S Reel Table Ass'y	U U
	PC-65	Tape Center Sensor	End Sensor Ass'y	O(PCB)
	PC-63 ×2	Tape Top/End Sensor	S/T Plate Ass'y	U
	SE-122 SE-123 SE-135	Sensor Relay	Front Left Side Right Side	O(MCB) O(MCB) O(MCB)
	SW-358	Eject Switch	Front	O(PCB)
	LE-70	Tape Running Indicator		O(PCB)
	PE-18	Power Indicator		O(PCB)

BLOCK	BOARD	CIRCUIT FUNCTION	LOCATION	SP CODE
FRAME <TTP>	PD-53	Tape Cleaner	FE/TC Ass'y	O(MCB)
	AH-39	Full Erase Head		O(PCB)
	AH-38	Channel Erase/RP Head	Stationary Head Ass'y	O(PCB)
	CH-26	CTL/TC Confi Head		O(PCB)
	CN-309	Head Cleaner	Cleaing Roller	Cleaning U Roller (P) Ass'y:s
	CN-171	DT Drive/Capstan Pinch Relay	Upper	O(MCB)
	CN-481 ×2	S/T Reel Motor Relay	S/T/Reel Table Ass'y	O(PCB)
	PC-42 ×2	T/S Spring Stretch		O(PCB)
	CN-565	Slider (S) UD Contact	Slider (S)	S (MCB)
	CN-625	Slider (T) UD Contact	Slider (T)	S (MCB)
	UD-3 UD-4	USG (S) Relay	Slider (S)	O(PCB) O(PCB)
	UD-3 UD-5	T-USG Relay	Slider (T)	O(PCB) O(PCB)
	MT-47 ×2	Reel Position/Loading Motor Relay	Reel Shift Motor Loading Motor	O(PCB)
	DET-18	Tension Sensor (DME)	T Tension Regulator Ass'y	O(MCB)
	DET-19		S Tension Regulator Ass'y	O(MCB)
	CN-590	Tension Regulator Relay	S Tension Regulator Ass'y	O(PCB)
	FL-136	Printed Circuit Board (Flexible) **Note: 3**	S Tension Regulator Ass'y	S(PCB)

Note: 3 This Board is used for S/N 10801 and higher (J)
This Board is used for S/N 10601 and higher (UC)
This Board is used for S/N 10501 and higher (PAL)

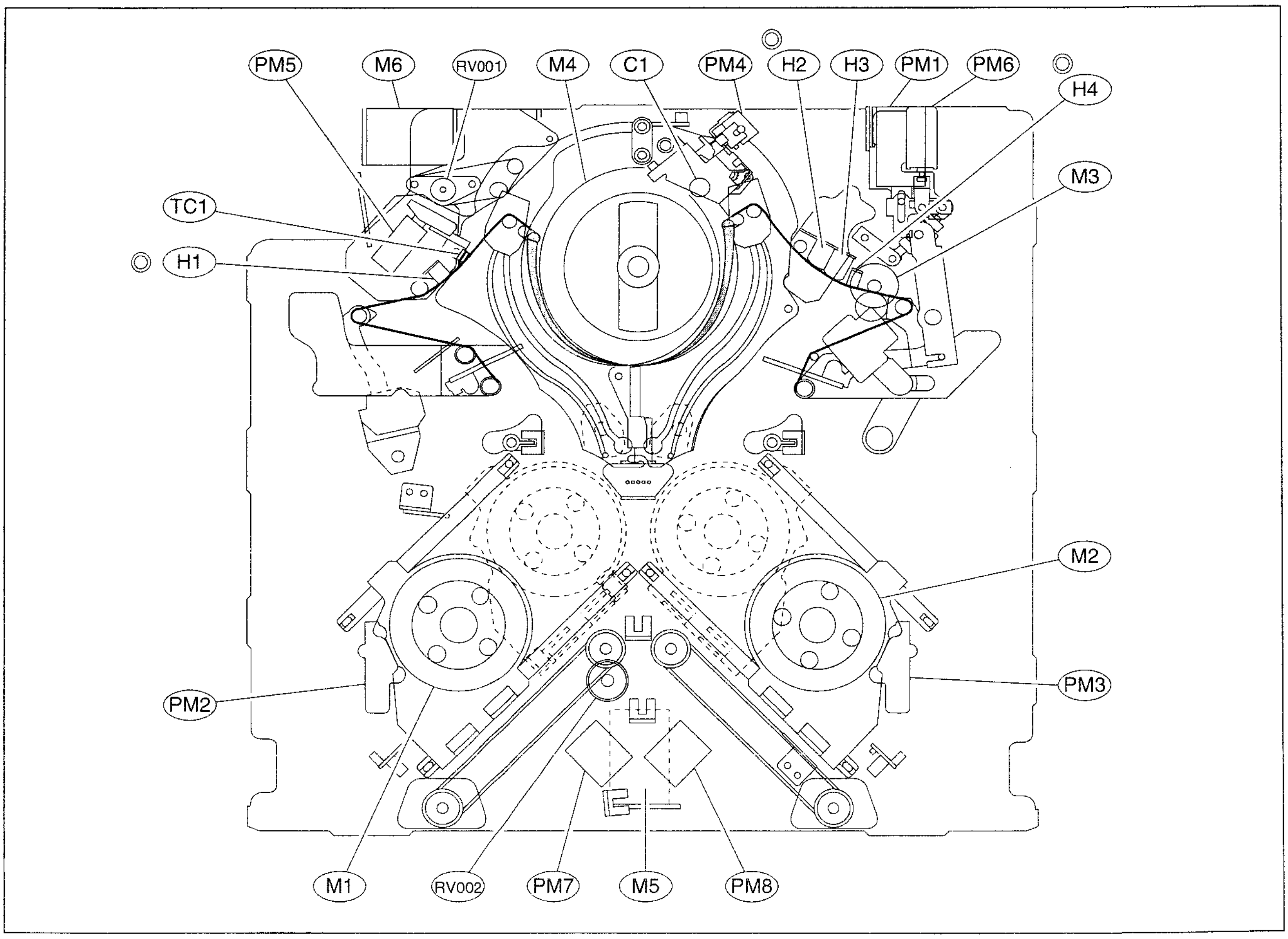
BLOCK	BOARD	CIRCUIT FUNCTION	LOCATION	SP CODE
FRAME <Connector Panel> (Remote & Digital I/O)	DIO-08	Digital Video IN/ OUT (D-sub)	Rear Connector Panel	O(MCB)
	RM-69	Remote (D-sub)		O(MCB)
	RY-11	Included in RM-69 Board **Note: 4**		O(MCB)
	DA-36	Digital Audio (XLR)		O(MCB)
	FP-30	Control Panel Relay	Front	O(MCB)
FRAME <Connector Panel> (Analog I/O)	CN-324	Analog Video (BNC)	Rear Connector Panel	O(PCB)
	CN-325 (UC/EK)	Analog Audio (XLR)		O(PCB)
	CN-396(J)	Analog Audio (XLR)		O(MCB)
	FC-61	Fan Motor Rotation Control		O(MCB)
	VR-95	Phone Jack	Front	O(MCB)
EXTENSION	EX-185	For Card Rack ②	Packing	S(MCB)
	EX-241	For DD-11, REC-11and SSP-07 Board		S(MCB)
	EX-341	For Card Rack ①		S(MCB)

Note: 4 This Board is used for S/N 10601 and higher (J)
This Board is used for S/N 10501 and higher (UC)
This Board is used for S/N 10501 and higher (PAL)

2-3. MAIN PARTS LOCATION

2-3-1. Tape Transport ① (This figure is for DVR-28.)

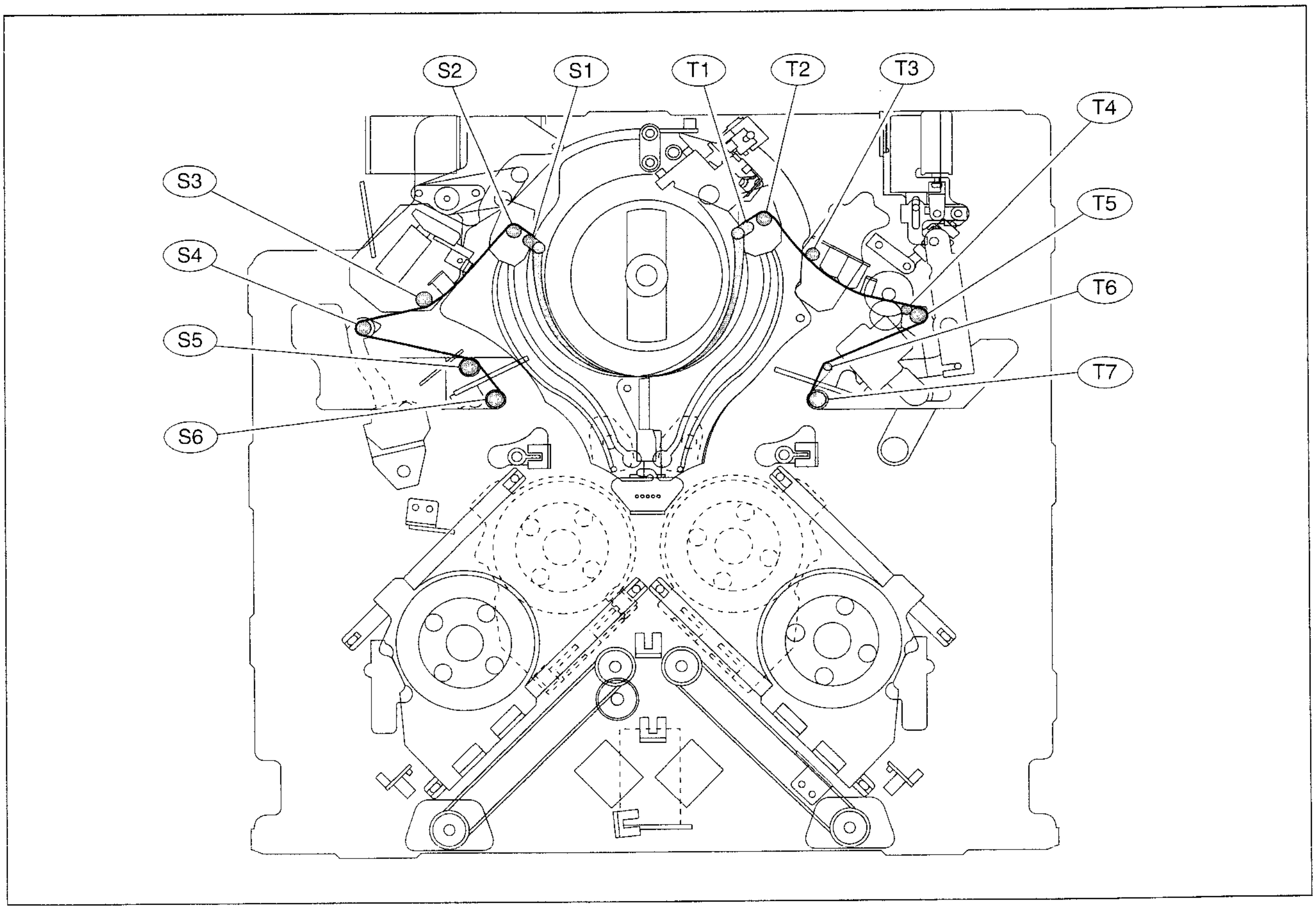
◎ mark: Not used for DVR-P28 (NTSC)



HEAD, MOTOR, SOLENOID, etc.

C1	Cleaning Roller	PM1	Pinch Solenoid
		PM2	S Brake Solenoid
H1	Full Erase Head (Not used for DVR-P28 NTSC)	PM3	T Brake Solenoid
H2	CUE/CTL/TC Erase Head (Not used for DVR-P28 NTSC)	PM4	Cleaning Roller Solenoid
		PM5	Tape Cleaner Solenoid
H3	CUE/CTL/TC R/P Head	PM6	Sub Pinch Solenoid
H4	CTL/TC CONFIDENCE HEAD (Not used for DVR-P28 NTSC)	PM7	S Reel Stopper Solenoid
		PM8	T Reel Stopper Solenoid
M1	S Reel Motor	RV001	Threading Potentiometer
M2	T Reel Motor	RV002	Reel Position Potentiometer
M3	Capstan Motor		
M4	Drum Motor	TC1	Tape Cleaner
M5	Reel Position Shift Motor		
M6	Loading Motor		

2-3-2. Tape Transport ② (This figure is for DVR-28.)


S2
S1
T1
T2
T3
T4
S3
T5
S4
T6
S5
T7
S6

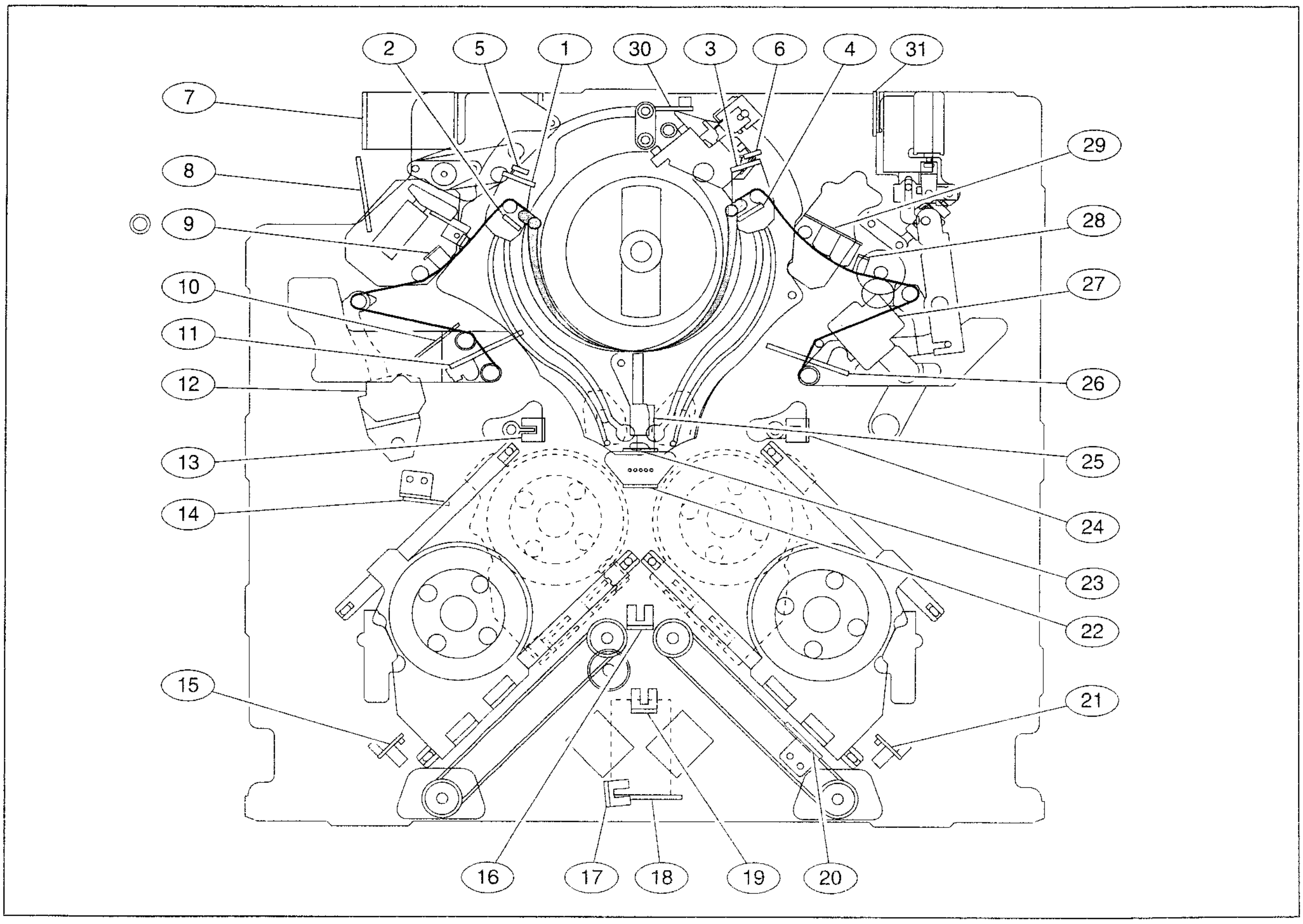
GUIDE

S1	Entrance Guide (S1)
S2	Guide S2
S3	Guide S3
S4	Tension Regulator Guide S4
S5	Guide S5
S6	Guide S6

T1	Exit Guide (T1)
T2	Guide T2
T3	Guide T3
T4	Guide T4
T5	Guide T5
T6	Tension Regulator Guide T6
T7	Guide T7

2-3-3. Tape Transport ③ (This figure is for DVR-28.)

◎ **mark:** Not used for DVR-P28 (NTSC)



PRINTED CIRCUIT BOARD

1. UD-4 Board: USG (S) Relay
2. UD-3 Board: USG (S) Relay
3. UD-5 Board: USG (T) Relay
4. UD-3 Board: USG (T) Relay
5. CN-565 Board: Slider (S) UD Contact

6. CN-625 Board: Slider (T) UD Contact
7. MT-47 Board: Loading Motor Relay
8. PD-53 Board: Tape Cleaner
9. AH-39 Board: Full Erase Head
   (Not used for DVR-P28 NTSC)
10. CN-590 Board: Tension Regulator

11. PC-63 Board: Tape End Sensor
12. DET-19 Board: S Tension Sensor
13. PC-42 Board: USER-S Sensor
14. CN-481 Board: S Reel Motor Relay
15. PC-42 Board: Reel Position Stroke (S) Sensor

16. PC-42 Board: User Center (S) Sensor
17. PC-42 Board: User Center (L) Sensor
18. MT-47 Board: Reel Position Relay
19. PC-42 Board: User Center (M) Sensor
20. CN-481 Board: T Reel Motor Relay

21. PC-42 Board: Reel Position Stroke (T) Sensor
22 LE-62 Board: Coding Hole Sensor (LED)
23. TR-43 Board: Coding Hole Sensor (Transistor)
24. PC-42 Board: USER-T Sensor
25. PC-65 Board: Tape Center Sensor

26. PC-63 Board: Tape Top Sensor
27. DET-18 Board: T Tension Sensor
28. CH-26 Board: Confidence Head
29. AH-27 Board: R/P Head (DVR-P28 NTSC)
    AH-38 Board: Channel Erase/RP Head (DVR-28)
30. CN-309 Board: Cleaning Roller Relay

31. CN-309 Board: Sub Solenoid Relay

2-3-4. Chassis

PRINTED CIRCUIT BOARD

101. AD-73 Board with DF-48 Board: Audio A/D, D/A Converter, Video A/D Converter (DVR-28)
     AD-90 Board: Audio D/A Converter (DVR-P28 NTSC)
102. AE-15 Board: CUE, TC, CTL, REC/PB Amp
103. CN-171 Board: DT Drive/Capstan Pinch Relay
104. RM-69 Board with RY-12 Board: Digital Video, Remote (D-sub)
105. CN-324 Board: Analog Video (BNC)

106. CN-325 Board (For UC/EK) : Analog Audio (XLR)
     CN-396 Board (For J) : Analog Audio (XLR)
107. DA-36 Board: Digital Audio (XLR)
108. DD-11 Board: DT Driver
109. DE-37/-36 Board: Inner/Outer Decoder, Audio Error Concealment, Video/Audio Deshuffling
110. DIO-08 Board: Digital Video IN/OUT (D-sub)

111. DM-63 Board: NOVRAM Timer
112. DT-16 Board with DF-45 Board: Dynamic Tracking Control
113. ED-24 Board: Error Detector
     (Not Used for DVR-P28 NTSC)
114. EN-99 Board: Video/Audio Shuffling, Outer/Inner Encoder, Channel Encoder
115. EQ-29 Board with RE-41 Board: PB EQ Amplifier, Channel Decoder

116. FC-61 Board: Fan Motor Rotation Control
117. FP-30 Board: Control Panel Relay
118. IF-331 Board: Parallel I/O, RS422, GPIB, RS232C
119. LO-14 Board: Audio Line Amplifier
120. LE-70 Board: Tape Running Indicator

121. MB-378 Board: RF/System/Servo Mother
122. MB-379 Board: Processor Board Mother
123. MD-62 Board with PD-53 Board: Motor Driver Pinch Sub Solenoid Driver
124. PE-18 Board: Power Indicator
125. PR-157/-163 Board: Video Error Concealment, Signal Processor
126. REC-11 Board with RE-83 Board: REC Amplifier
     (Not Used for DVR-P28 NTSC)
127. SE-122 Board: Sensor Relay
128. SE-123 Board: Sensor Relay
129. SE-135 Board: Sensor Relay
130. SSP-07 Board: System Control Reel, Capstan, Drum Servo Control Servo Sub Control
131. SW-358 Board: Eject Switch
132. UC-2 Board: Ultra Sonic Guide Control
133. VM-05 Board: Video D/A Converter
134. VR-95 Board: Phone Jack

MOTOR

M7. Fan Motor
M8. Fan Motor

2-3-5. Cassette Compartment

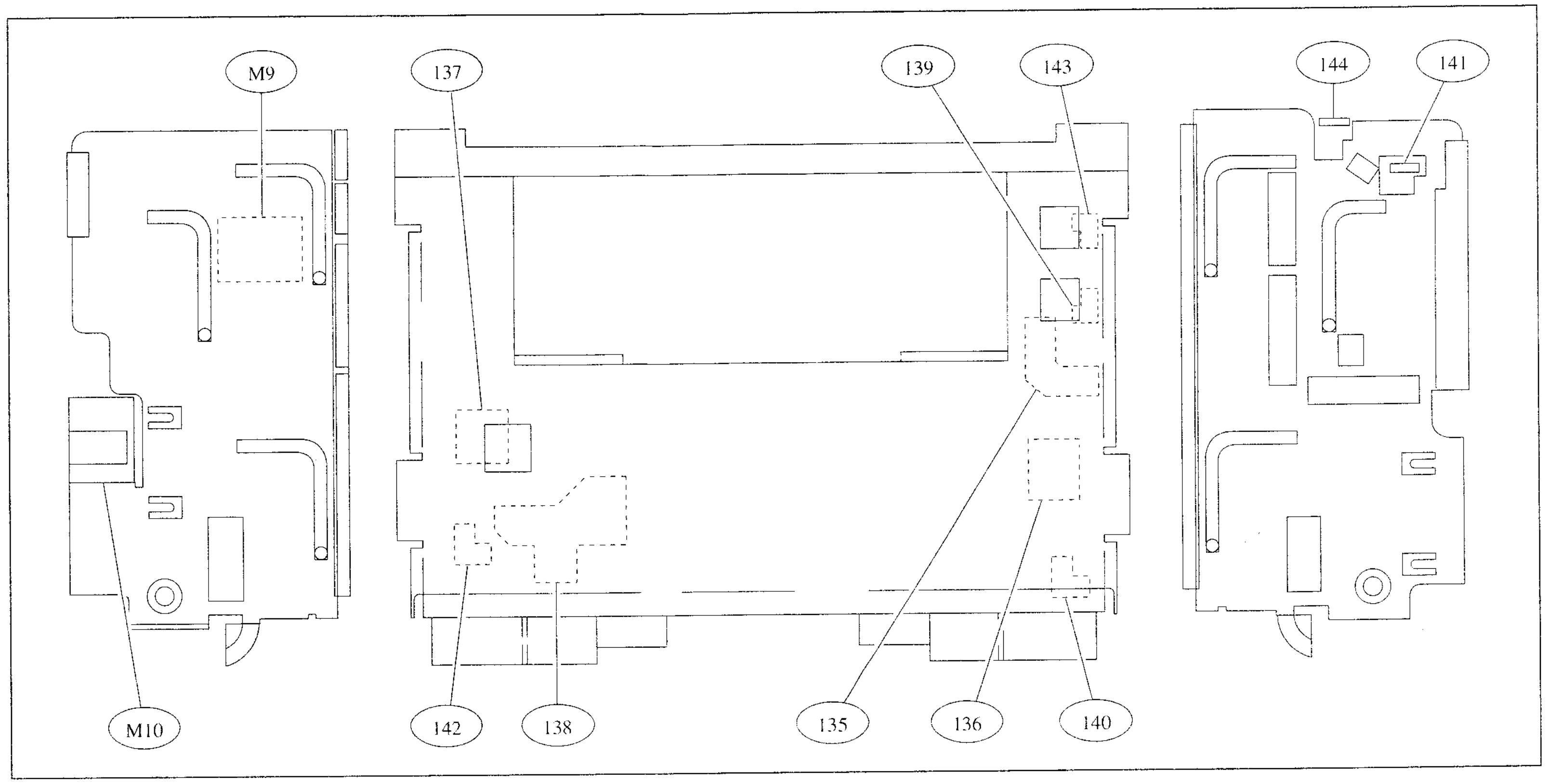
PRINTED CIRCUIT BOARD

135. PC-50 Board: Inner Motor, Cassette Sensor Relay
136. PC-51 Board: Inner Motor, Cassette Sensor Relay
137. PC-52 Board: Inner Motor, Cassette Sensor Relay
138. PC-53 Board: Cassette In/M Size Sensor
139. PC-54 Board: Inner Up Sensor

140. PC-54 Board: Outer Up Sensor
141. PC-55 Board: Outer Down Sensor
142. PC-55 Board: Cassette L Size Sensor
143. PC-55 Board: Inner Down Sensor
144. PC-55 Board: Outer Mid Sensor

MOTOR

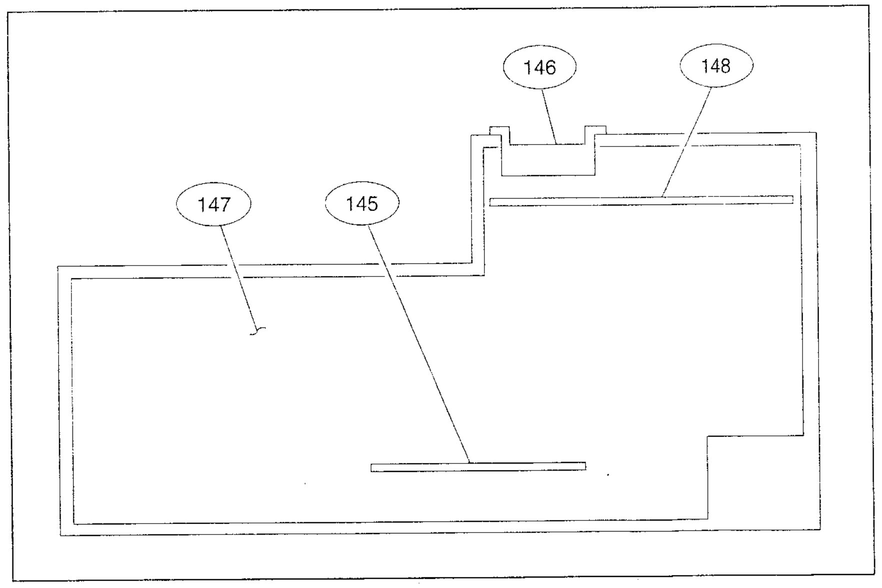
M9. Inner Motor, Cassette Compartment
M10. Outer Motor, Cassette Compartment



2-3-6. Power Supply

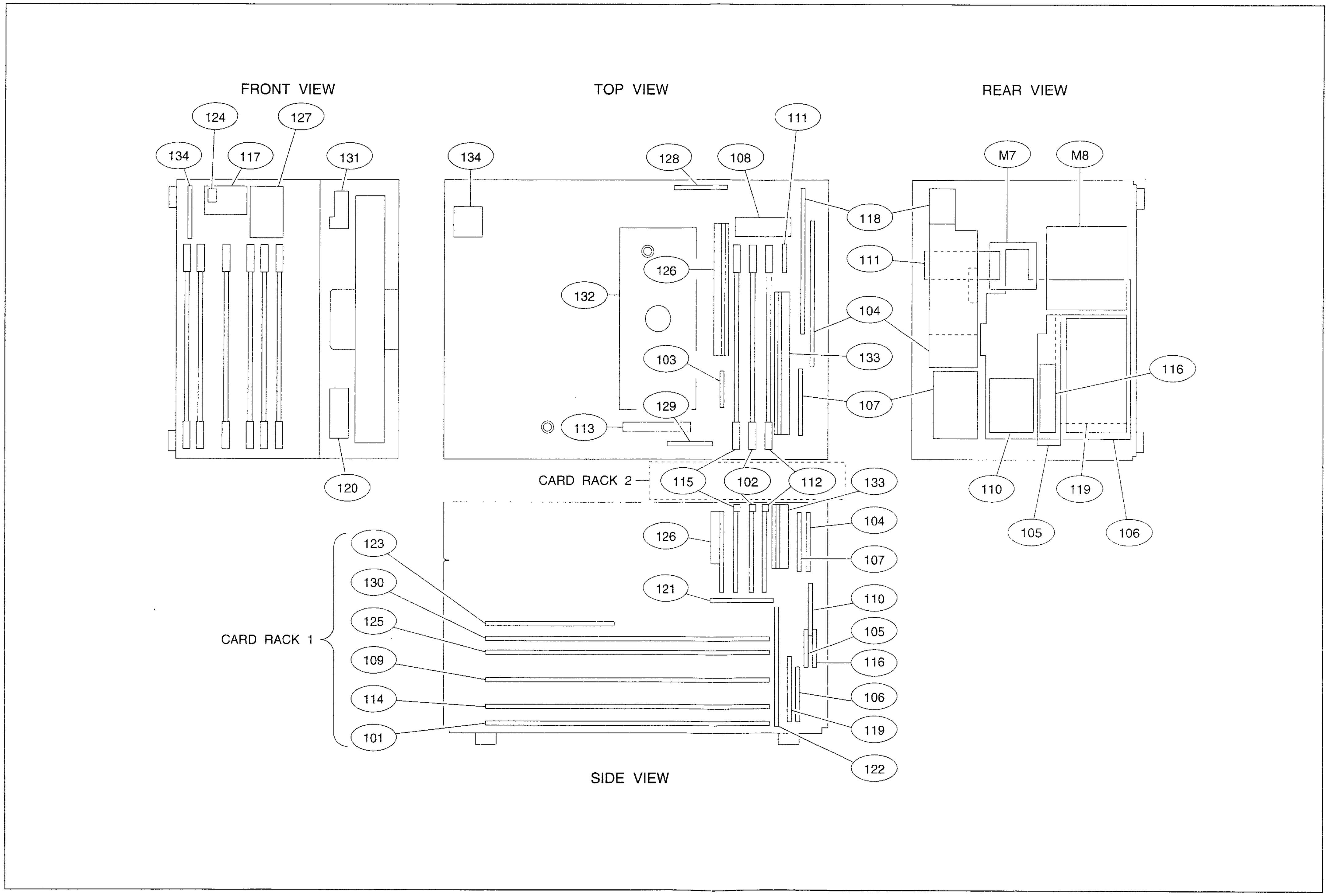
PRITED CIRCUIT BOARD

145. CT-133 Board: Regulator Control
146. FU-53 Board: Fuse Board
147. PS-256 Board: Power Supply
148. RE-52 Board: Switching Regulator



These figures are for DVR-28.

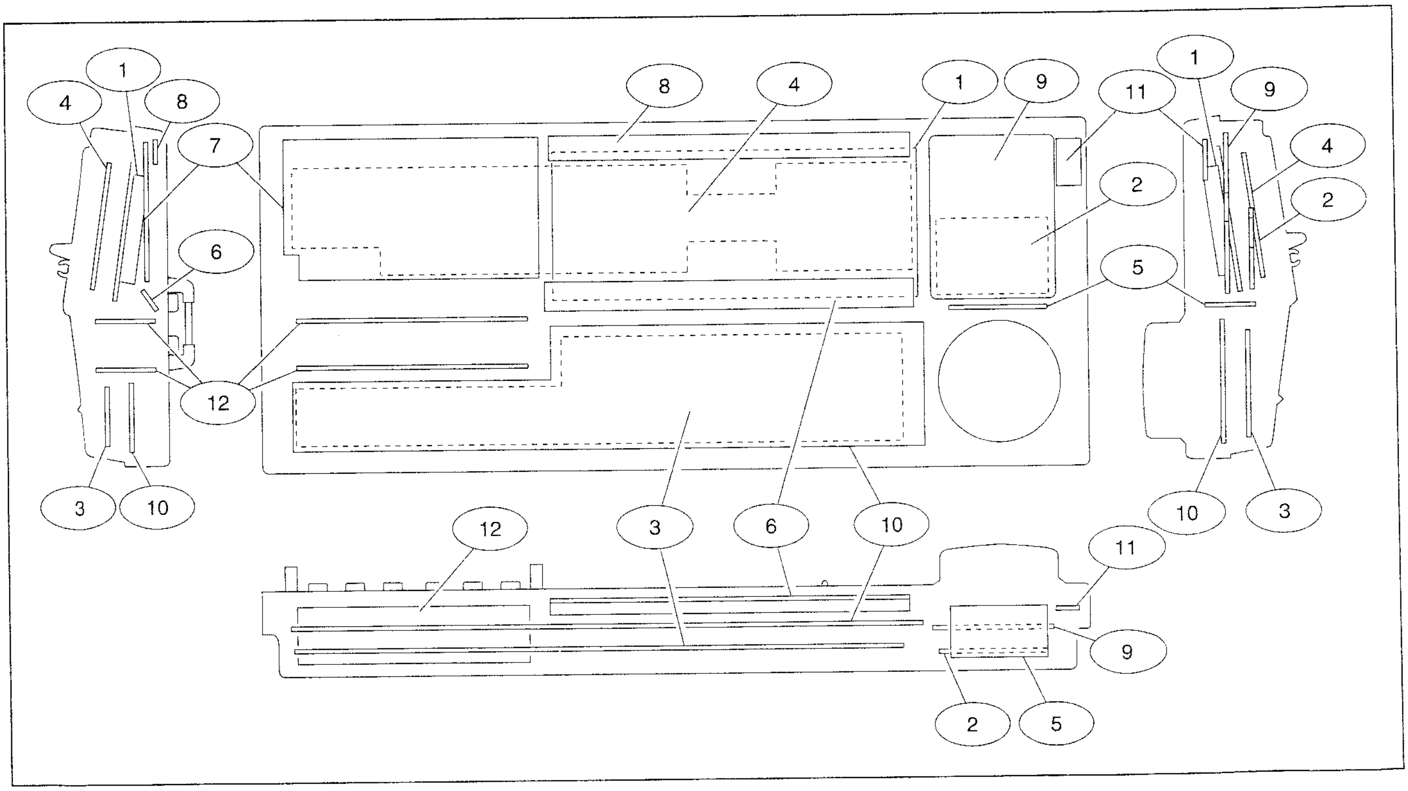
◎ **mark:** Not used for DVR-P28 (NTSC)


FRONT VIEW
124
127
134
117
131
120
TOP VIEW
111
134
128
108
118
111
126
132
104
133
103
107
129
113
CARD RACK 2
115
102
112
133
REAR VIEW
M7
M8
116
110
119
105
106
123
130
125
109
114
101
CARD RACK 1
126
121
104
107
110
105
116
106
119
122
SIDE VIEW

This figure is for DVR-28.

2-3-7. Function Control Panels, BKDV-200/201/202 (Option)

1. FL Panel (Fluorescence Luminesent Panel)
2. CN-544 Board: 8-pin Connector
3. CP-174 Board: CPU
4. CP-178 Board: CPU
5. DET-11 Board: Switch Dial Detector
6. ES-03 Board: Function Switch
7. LD-44 Board: Audio Level Meter
8. LE-96 Board: Channel Condition
9. SW-461 Board: Monitor Select
10. SW-462 Board (For BKDV-201/202): Main Switch
    SW-462A Board (For BKDV-200): Main Switch
11. SW-465 Board: Mode Shift Switch
12. VR-121 Board: Audio VOL



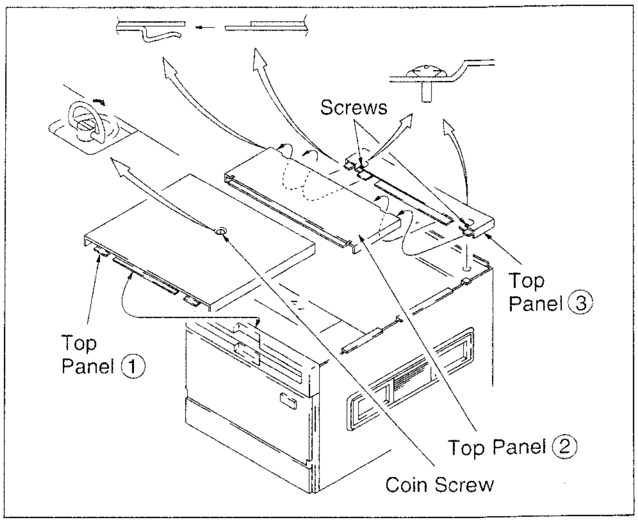
2-4. REMOVAL OF CABINETS

Removal of Top Panels

(1) Loosen the coin screw fully, and remove the Top Panel ①.

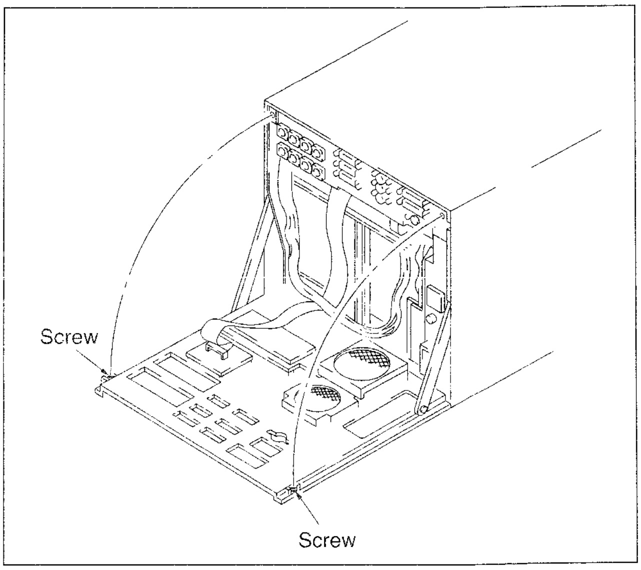
(2) Remove the Top Panel ② from the Top Panel ③ as shown in the figure.

(3) Loosen fully the two screws in the figure, and remove the Top Panel ③.


Screws
Top Panel ③
Top Panel ①
Top Panel ②
Coin Screw

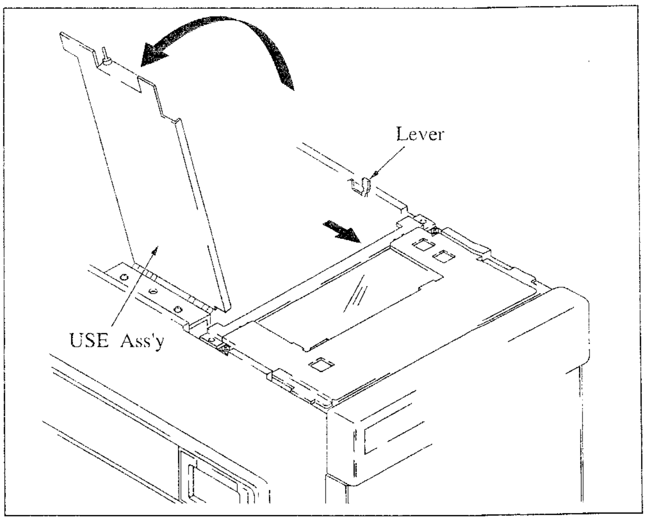
Opening of connector panel

Loosen fully the two screws in the figure, and then open the connector panel.


Screw
Screw

Opening of USE Ass'y

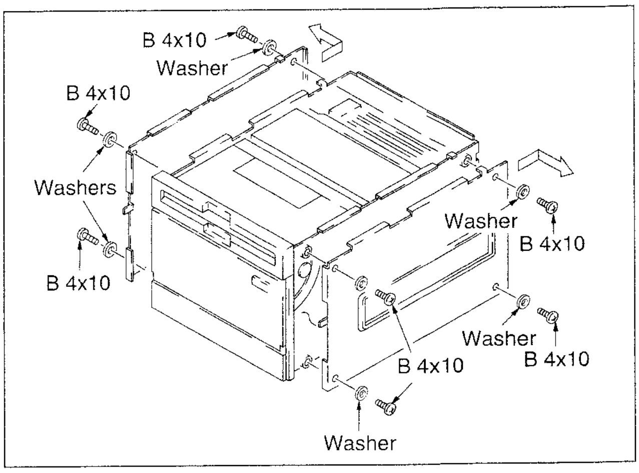
Push the lever in the figure in the direction of the arrow, and open USE Ass'y.


Lever
USE Ass'y

Removal of side panels

After opening the connector panel and removing the top panels, remove the eight screws (B4x10) and the eight washers as shown in the figure. (Four on each side)

Remove the side panels in the direction of the arrow.

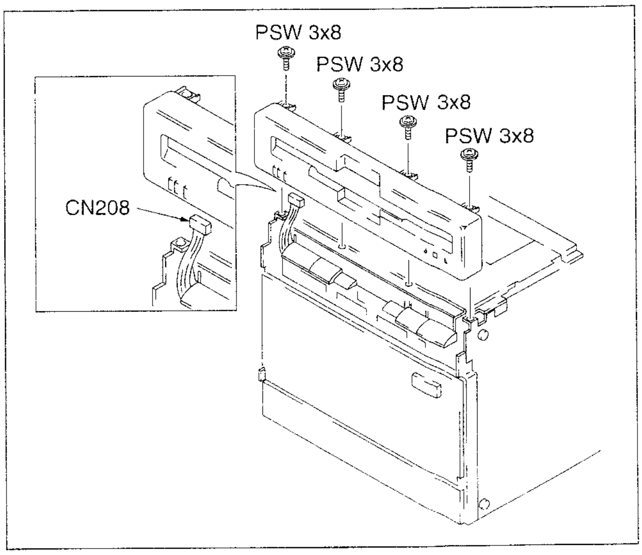

B 4x10
Washer
B 4x10
Washers
B 4x10
Washer
B 4x10
Washer
B 4x10
B 4x10
Washer

Removal of front panel

After removing the top panel, remove the power switch button and control knobs.

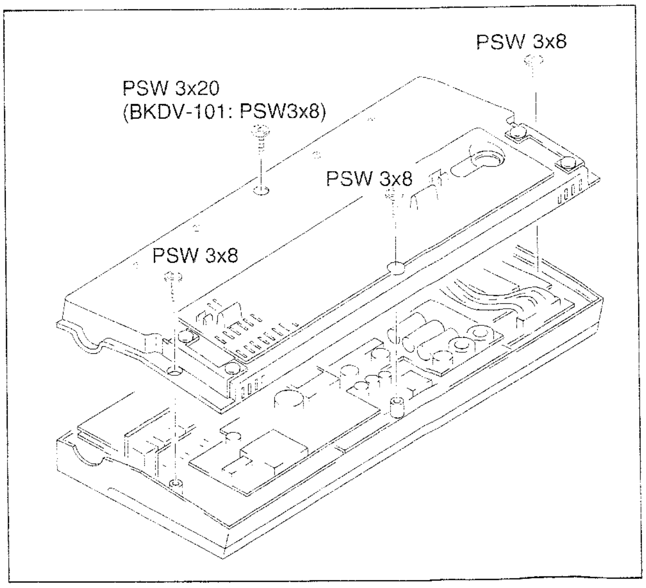
Remove the two screws (PSW3x6) as shown in the figure.

Then, lift up the front panel slightly and remove it in the direction of the arrow.


PSW 3x8
PSW 3x8
PSW 3x8
PSW 3x8
CN208

Removal of bottom panel of function control panel

Remove the four screws (PSW3x8) as shown in the figure.

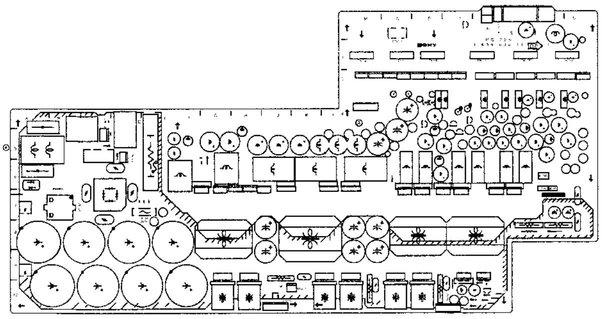

PSW 3x8
PSW 3x20
(BKDV-101: PSW3x8)
PSW 3x8
PSW 3x8

2-5. NOTES ON POWER UNIT

2-5-1. Primary Circuit & Electric Shock

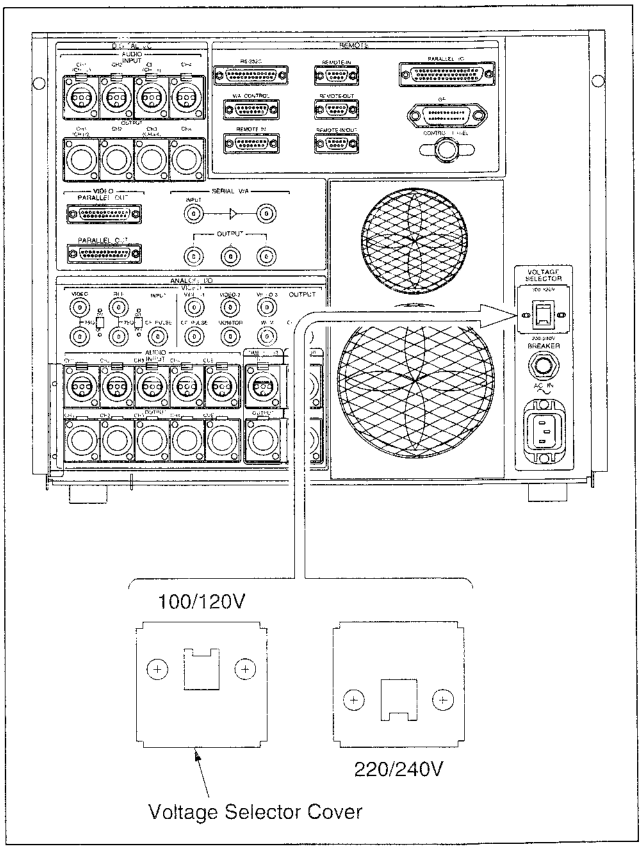
The power supply section consists of PS-256, CT-133, RE-52 and FU-53 boards, and also the primary side circuit peripheral components.
These parts are contained in a single case, forming a power supply unit.
All of CT-133 board and the shaded portion of PS-256 board are on the primary side circuit, and are thus at mains potential. Take care to avoid electric shock.
The heat sink in the primary side circuit on PS-256 board is also connected to the primary circuit.
Even after the power is turned OFF, a high voltage will remain on the shaded portion on PS-256 board. Therefore, be careful when handling the board.

PS-256 Board (Component side)



2-5-2. Notes on Voltage Selector

The voltage selector is factory set to the destination local power supply voltage.
Repair parts supplied from Sony Parts Center are set to 220-240V for safety. When replacing the power unit, check the voltage is set to 100-120V or 220-240V according to the local power supply. Be sure to set the voltage selector to the local power supply before the power switch is turned ON. The voltage is changed by the position of the voltage selector cover as shown in the figure.

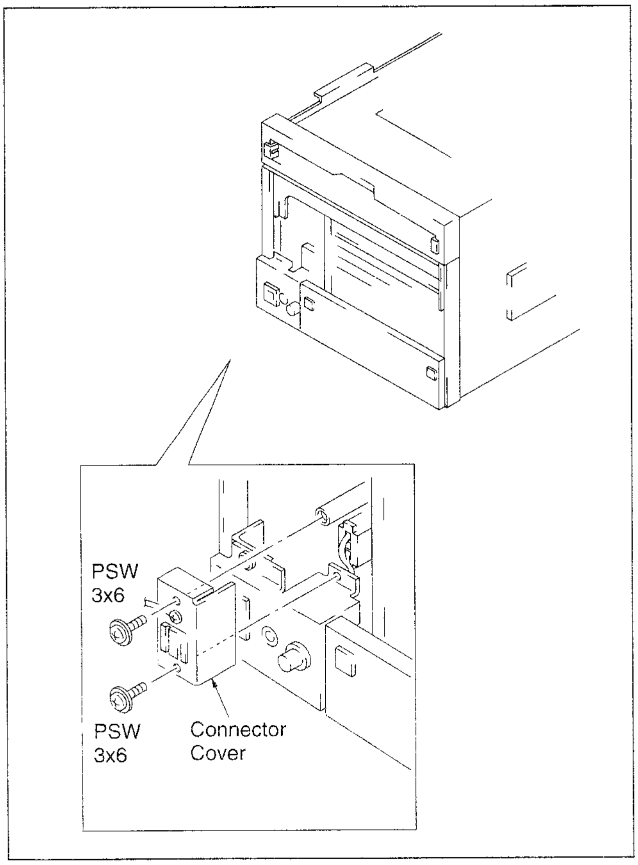


This figure is for DVR-28.

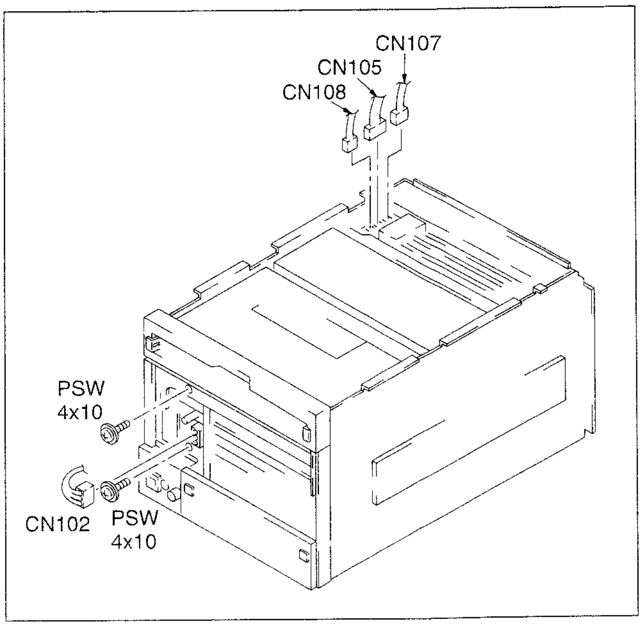
2-5-3. Removal of Power Supply

Note: Before removing the power supply, turn the power switch OFF and also pull out the power cord.

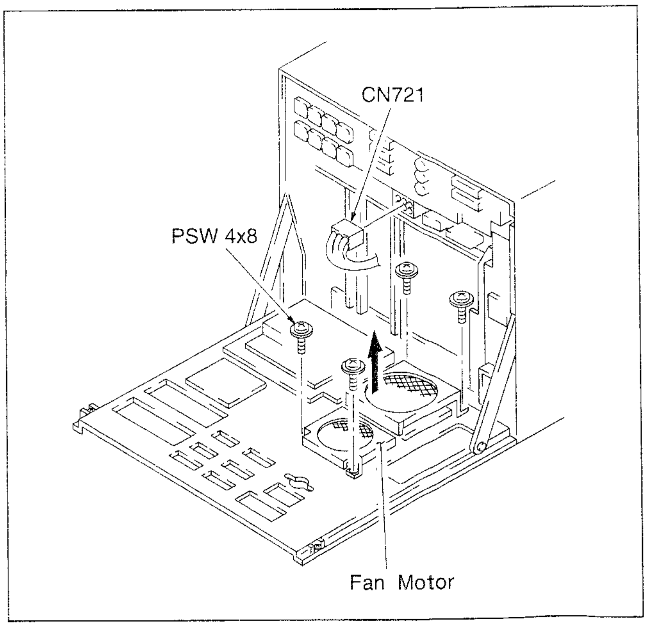
(1) Open the blank panel or function control panel.
(For details, refer to Section 1-7 "Installing the Function Control Panel.")
(2) Remove the two screws (PSW3x6) as shown in the figure and then remove the connector cover.


PSW
3x6
PSW
3x6
Connector
Cover

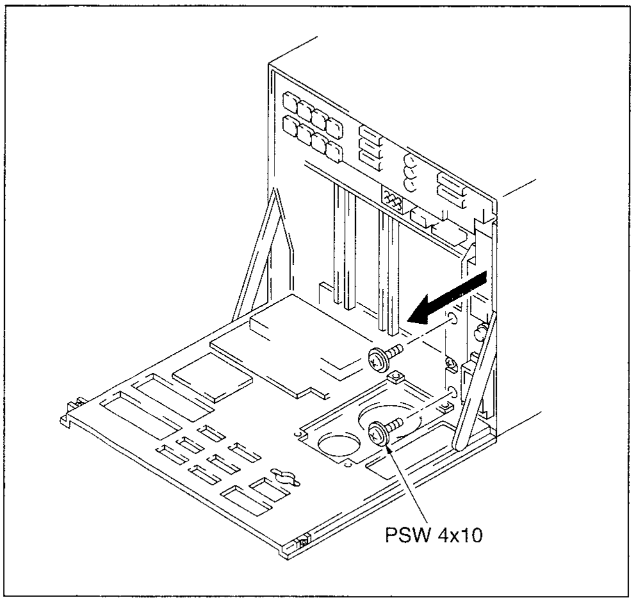
(3) Disconnect the connectors CN102.
(4) Remove the two screws (PSW4x10).
(5) Remove the top panel.
(6) Disconnect the connectors CN105, CN107 and CN108.


CN107
CN105
CN108
PSW
4x10
CN102
PSW
4x10

(7) Open the connector panel.
(8) Disconnect the connector CN721.
(9) Remove the four screws (PSW4x8) on the fan motor and then remove the fan motor.


CN721
PSW 4x8
Fan Motor

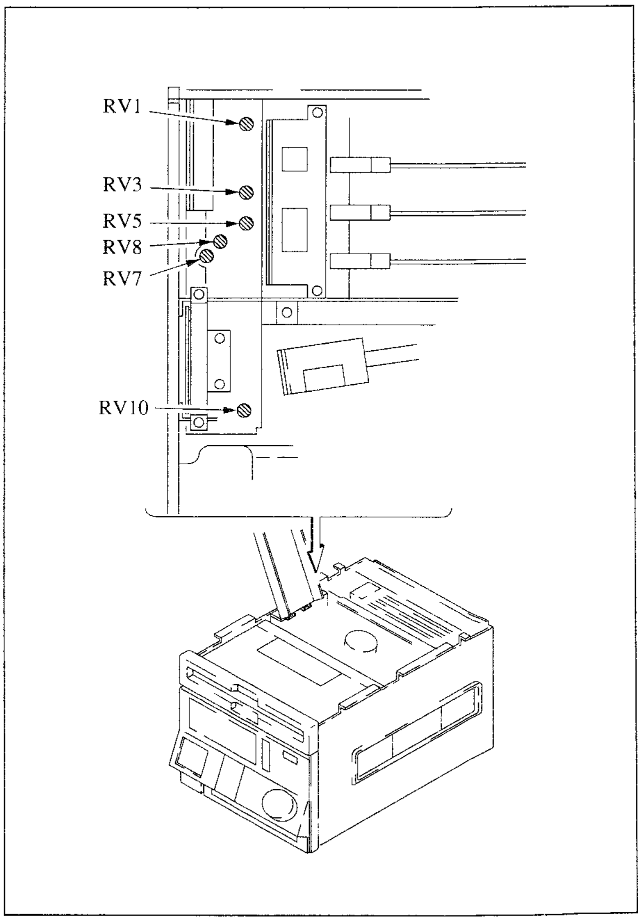
(10) Remove the two screws (PSW4x10) which install the power supply.
(11) Remove the power supply in the direction of the arrow.



2-5-4. Power Supply Adjustment

Remove the top panels, turn the power ON, and check the operation of the power supply.
In this condition RE-52 board can be adjusted through the holes at the top of the power supply case.
When adjusting and measuring at the TP terminals inside the power supply case, remove the power supply cover according to Section 2-5-5.
For details of the adjustment procedures, refer to Section 8 "Power Supply Alignment."

Note: Almost all of the circuits inside of the power supply case are on the primary side circuit.
When inserting an alignment screwdriver into the case, be very careful not to touch other conductive parts.

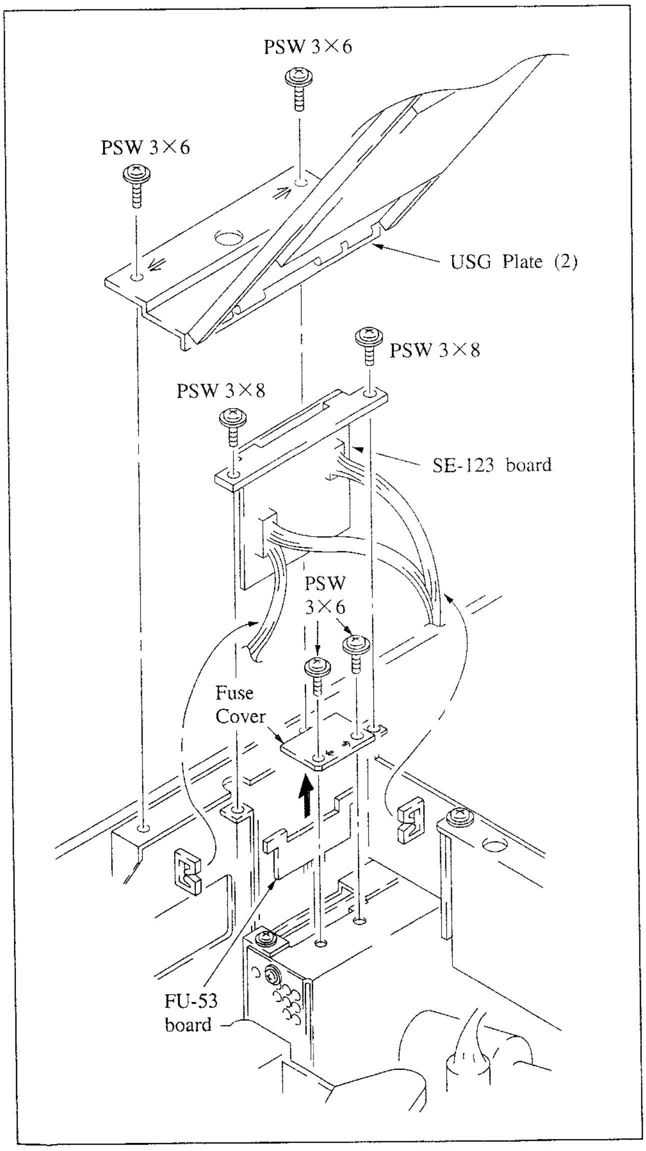


2-5-5. Removal of FU-53/PS-256/RE-52/CT-133 Boards

Note: Before checking the power supply unit, turn the power OFF and pull out the power cord.
Even after the power is turned OFF, a high voltage will remain on the primary side circuit on PS-256 board.
Be careful, when handling the board.

Removal of FU-53 board

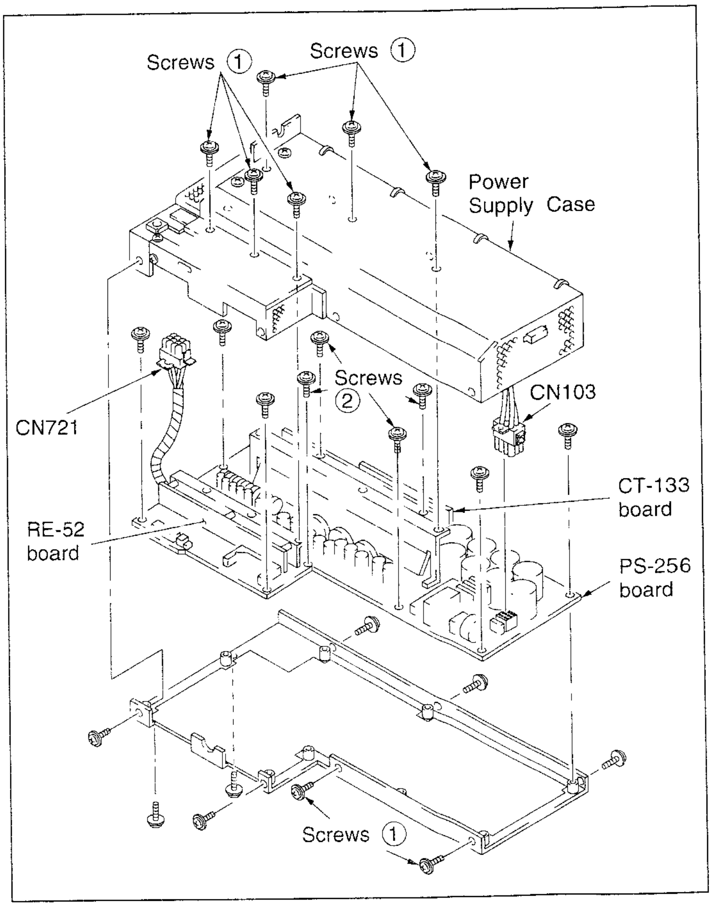
(1) Remove the two screws (PSW 3x6) as shown in the figure and then remove USG Plate (2).
(2) Remove the two screws (PSW3x8) as shown in the figure and then pull out SE-123 board.
(3) Remove the two screws (PSW3x6) and then remove the fuse cover.
(4) Pull out FU-53 board from CN106 connector on PS-256 board in the direction of the arrow.


PSW 3×6
PSW 3×6
USG Plate (2)
PSW 3×8
PSW 3×8
SE-123 board
PSW 3×6
Fuse Cover
FU-53 board

Removal of PS-256/RE-52/CT-133 Boards

RE-52 and CT-133 boards are installed on the PS-256 board.

(1) After removing the power supply, remove the fourteen screws ① (PSW3x8) and then remove the power supply case.
(2) Disconnect the connector CN103 on PS-256 board, and remove the connector CN721 from the cable clamper of the power supply case.
(3) Remove RE-52 or CT-133 board if necessary.
(4) Remove the nine screws ② (PSW3x8) and then remove PS-256 board.


Screws ①
Screws ①
Power Supply Case
Screws ②
CN103
CN721
CT-133 board
RE-52 board
PS-256 board
Screws ①

2-5-6. Extension Cable for the SW-REG Adjustment

When checking or repairing the boards inside the power supply, an extension cable is required to supply power to the boards. Before using the cable, see Section 2-5-1 "Primary Circuit & Electric Shock" and be careful of the electric shock hazard. When connecting these cables, turn the power off and pull out the power cord.

(1) Connect the A side of SW-REG adjustment extension cable ① to the connector CN105/107/108 (Male) on PS-256 board, and the B side of this cable to the connectors CN105/107/108 (Female). (Fig. A)

(2) Connect the C side of SW-REG adjustment extension cable ② to the connector CN102 (Male) and the D side of this cable to the connector CN102 (Female).

(3) Connect the E side of SW-REG adjustment extension cable ③ to the connector CN721 (Male) on MB-379 board and the F side of this cable to the connector CN721 (Female). (Fig.B)

Fig. B

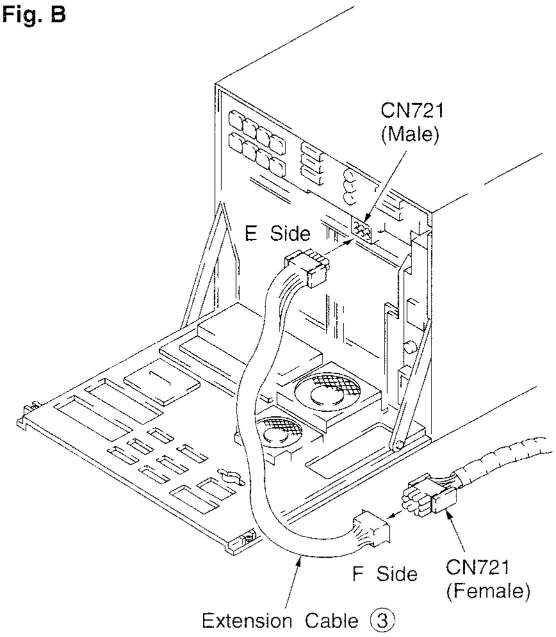
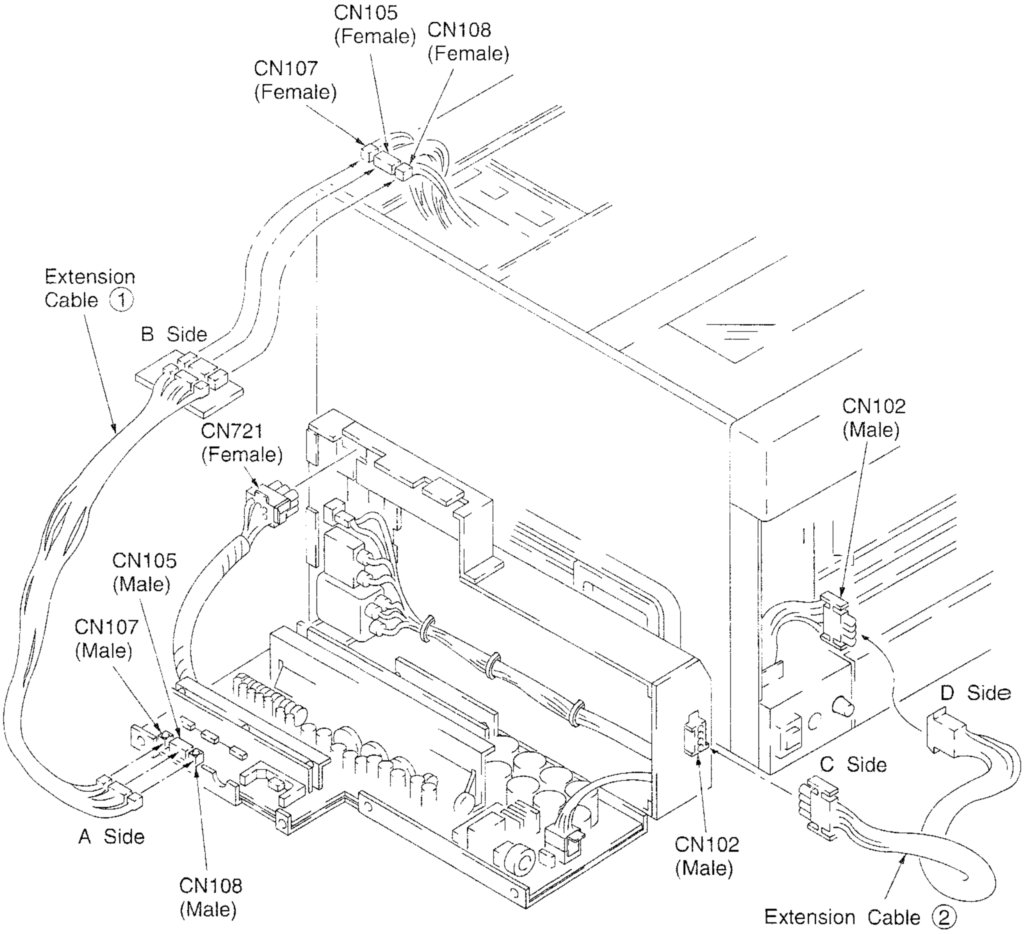

CN721
(Male)
E Side
F Side
CN721
(Female)
Extension Cable ③

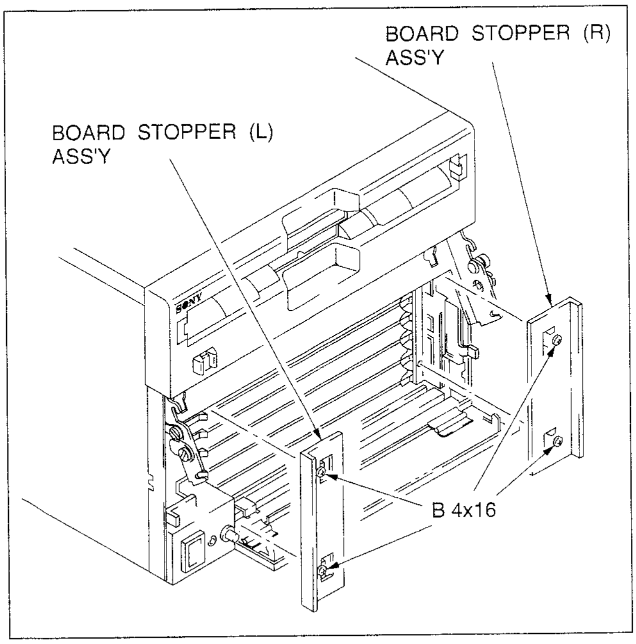
Fig. A


CN105
(Female)
CN108
(Female)
CN107
(Female)
Extension
Cable ①
B Side
CN721
(Female)
CN102
(Male)
CN105
(Male)
CN107
(Male)
D Side
C Side
A Side
CN102
(Male)
CN108
(Male)
Extension Cable ②

2-6. REMOVING/INSERTING PLUG-IN BOARDS

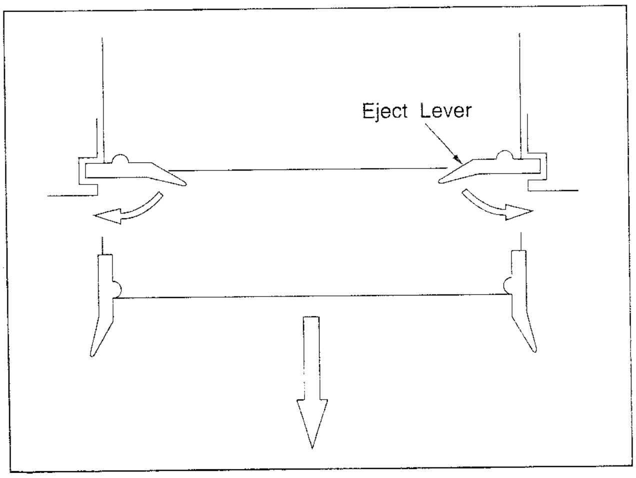
After turning the power OFF, remove or insert the plug-in board.

When removing the Card Rack-1 (Processor block), loosen the four screws (two on each side) as shown in the figure, and remove the board stopper ass'ys.



Removing the board

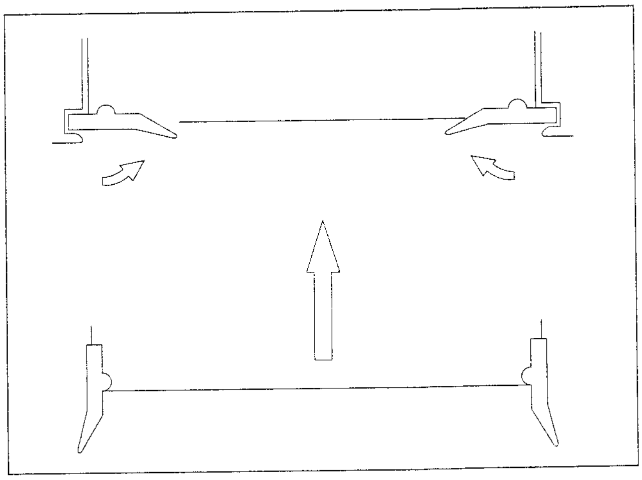
Pull up the eject levers on the board in the direction of the arrows when removing the board from the connector.
Do not try to pull the board by grasping any of the components on the board.



Inserting the board

Keep the eject levers in the pulled up position and slowly insert the board. After inserting the board in the grooves as shown in the figure, push down the eject levers and push the board in.

Note: Do not insert the board into the grooves with the eject levers pushed down.



2-7. NOTES ON REPAIR PARTS

2-7-1. Notes on Repair Parts

(1) Safety Related Components Warning

The ⚠ marked components on the schematic diagrams, exploded views and electrical spare parts list are critical to safety. Replace only with the same components as specified.

(2) Standardization of Parts

Replacement parts supplied from the Sony Parts Center will sometimes have a different shape and outside view from the parts which are used in the unit.
This is due to accommodating improved parts and/or engineering changes or standardization of genuine parts.
This manual's exploded views and electrical spare parts list indicate the part numbers of current standardized genuine parts.

(3) Stock of Parts

The parts marked with "s" in the SP (Supply Code) column of the exploded views and electrical spare parts list are normally stocked for replacement purposes.
The parts marked with "o" in the SP column are not normally required for routine service work. Orders for parts marked with "o" with be processed, but allow for additional time for delivery.

(4) Units for Capacitors, Inductors and Resistors

The following units are assumed in schematic diagrams, electrical parts list and exploded views unless otherwise specified.

Capacitors: µF
Inductors : µH
Resistors : ohm

(5) Voltage Selector

Repair parts supplied from Sony Parts Center are set to 220-240V.
For details, refer to Section 2-5-2 "Notes on Voltage Selector."

(6) Change of Parts

Regarding engineering parts changes, refer to Section 22 "Changed Parts."

2-7-2. Replacement Procedure of Chip Parts

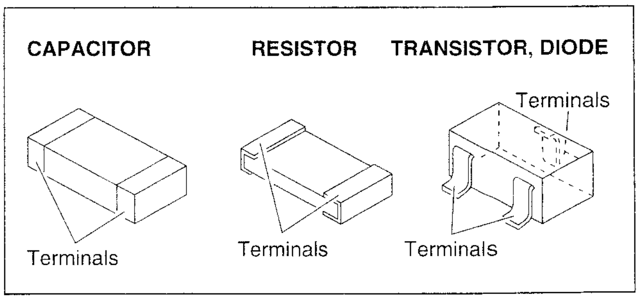
Required Tools:
Soldering iron: 20W
If possible, use a soldering-iron tip heat-controller set to 270±10°C.

Braided wire (Desoldering metal braid):
SOLDER TAUL or equivalent
Sony part No. 7-641-300-81

Solder: 0.6 mm dia. is recommended.

Tweezers

Soldering Conditions:
Soldering iron temperature: 270±10°C
Soldering time: 2 seconds per pin



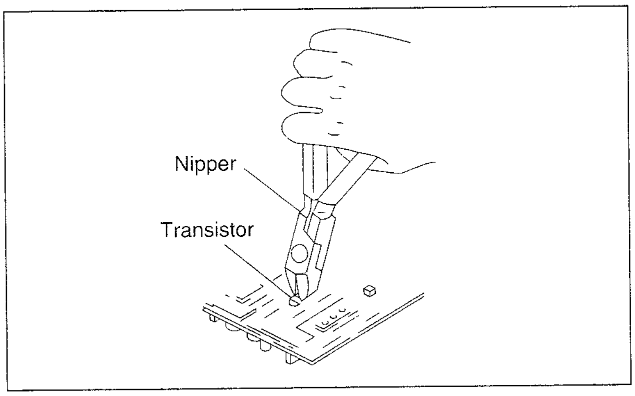
Replacement of Resistor and Capacitor

(1) Place the soldering-iron tip onto the chip part and heat it up until the solder is melted.
When the solder is melted, slide the chip part aside.
(2) Make sure that there is no pattern peeling, damage and/or bridge around the desoldering position.
(3) After removing the chip part, presolder the area, in which the new chip part is to be placed, with a thin layer of solder.
(4) Place new chip part in the desired position and solder both ends.

Note: Do not use a chip part again once it has been removed.

Replacement of Transistors and Diodes

(1) Cut the terminals of the chip part with nippers.
(2) Remove the cut leads as above.
(3) Make sure that there is no pattern peeling, damage and/or bridge around the desoldering positions.
(4) After removing the chip part, presolder the area, in which the new chip part is to be placed, with a thin layer of solder.
(5) Place new chip part in the desired position and solder the terminals.



Replacement of ICs

(1) Using the braided wire (desoldering metal braid), "SOLDER TAUL" Sony Part No. 7-641-300-81, remove the solder around the pins of the IC-chip to be removed.
(2) While heating up the pins, remove them one by one using sharp-pointed tweezers.
(3) Make sure that there is no pattern peeling, damage and/or bridge around t he desoldering position.
(4) After removing the chip part, presolder the area, in which the new chip part is to be placed, with a thin layer of solder.
(5) Place new chip part in the desired position and solder the pins.

2-7-3. Replacing Backup Battery

The following boards are provided with a RAM backup battery. When replacing a RAM back up battery, be sure to use the battery listed in the parts list.
The replacement procedures are described below:

DM-63 board

When the battery on DM-63 board runs down, no message will be displayed on the EL panel, hence it is necessary to replace this battery periodically. The standard replacement interval is 4 or 5 years after you purchased the VTR.
Replace the battery using the following procedures:

(1) Turn the power ON, and after three minutes turn it OFF again and then remove the board.
(2) When replacing the battery, take care not to touch any conductive parts other than the battery.
Even after the battery has been removed, the data will be retained for several days, however the battery should be replaced with a new one as quickly as possible.

Note: Unless the above procedures are followed, all of the RAM data will be lost.

SSP-07 Board

Two NOVRAMs which have a built-in battery, are mounted on SSP-07 board.
The standard replacement interval is about ten years.
Replace the battery using the following procedures:

① IC733 (address F10)
  (1) Turn the power ON, and remove the board.
  (2) Remove IC733 (address F10) from the IC socket and replace it with new one.
  It is not necessary to initialize the NOVRAM.
② IC25 (address E2)
  (1) Turn the power ON, and remove the board.
  (2) Remove IC25 (address E2) from the IC socket and replace it with new one.
  (3) After replacement, install SSP-07 board and turn the power ON pressing S1 (SET UP switch).
  Press S1 continuously, until LED D2 blinks.
  (4) Remake the entry of SET UP USER SETTING 1 to 3 (F1 to F3).

When IC25 is replaced, the USER SETTING DATA is lost. For details about the initialization of NOVRAM, please consult the service personnel.

CP-178 Boards

Refer to the Maintenance Manual of BKDV-201/200/202.

CP-120 Board

Refer to the Maintenance Manual of BKDV-101.

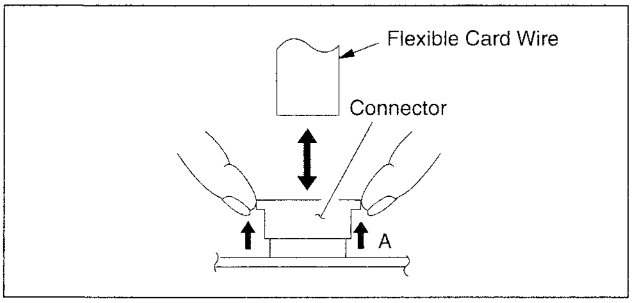
2-7-4. Replacing Flexible Card Wire

4P and 10P cables are used in the cassette-up compartment, 6P cable is used on DET-19 board and 32P cable is used in the reel motor.
When handling the cable, be very careful not to bend it because it will markedly reduce its life.

Disconnecting the cable

(1) Pull portion A of the connector to the cable side, as shown in the figure.
Note: Under no circumstances pull the cable first.

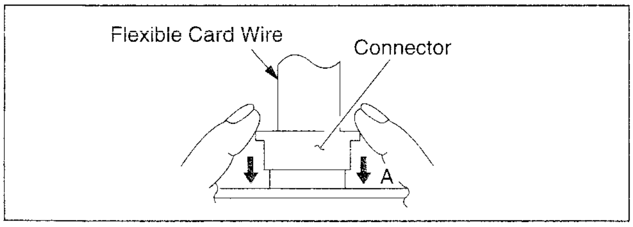
(2) Disconnect the cable.



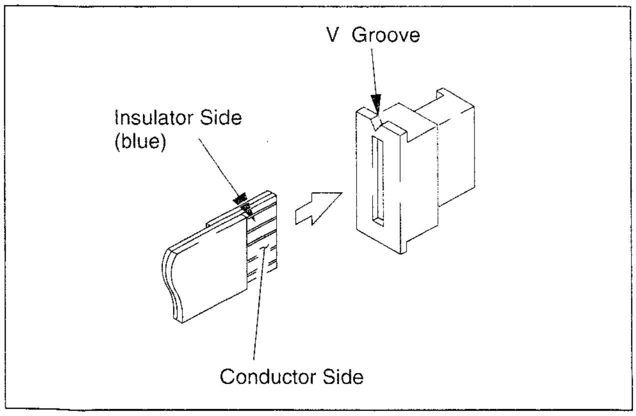
Connecting the cable

(1) Identify the front and back faces of the cable, then insert the cable into the connector.

(2) Insert portion A of the connector.



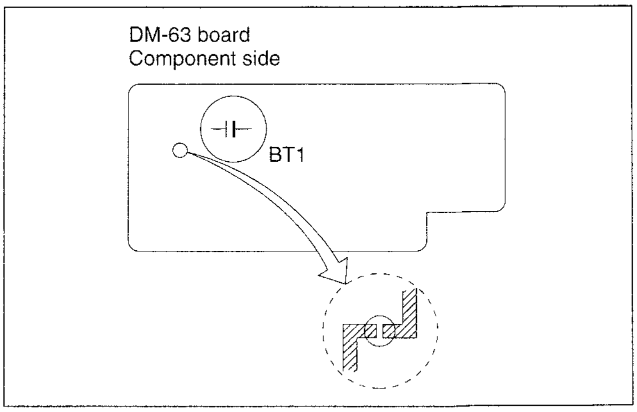
Note: The flexible card wire consists of conductor side and insulator side.
After checking the direction of conductor side and insulator side as shown in the figure, connect the flexible card wire into the V groove.
No operation will result if the cable is inserted wrongly.



2-8. NOTES ON REPLACING BOARDS

Replacement of DM-63 Board

(1) The Backup Battery Pattern Slit Short
Short the soldering jumper on the component side on DM-63 board.
Check that the voltage between the shorted portion and the GND on the board is 3.1+0.3 Vdc/–0.1 Vdc.



(2) NOVRAM Data Transfer

A NOVRAM and maintenance timers are mounted on DM-63 board. This NOVRAM can be read/written about 10,000 times. When DM-63 board is replaced, all the timers for the following total time/number are reset.
*The total time that the power of the unit has been turned ON
*The total rotation time of the head drum
*The total running time of the tape
*The total number of threading/unthreading operations

It is necessary to transfer the NOVRAM data from the board that was replaced.
For details, please consult the service personnel.

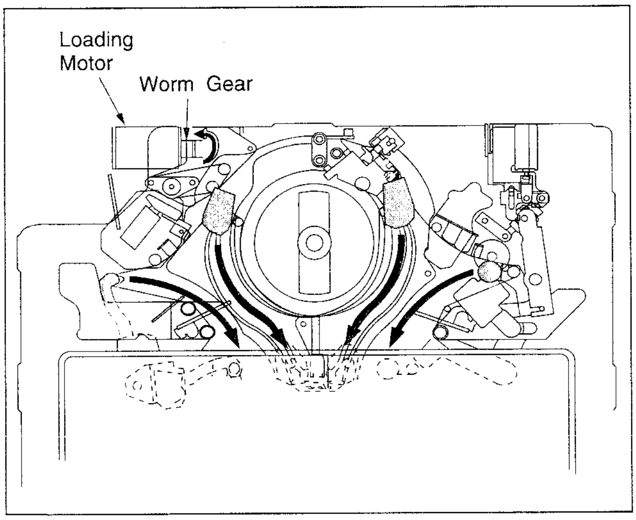
Replacement of SSP-07 Board

Two NOVRAMs which have a built-in battery, are mounted on SSP-07 board. These NOVRAM's life is about 10 years.
When replacing IC733 (address F10), it is not necessary to initialize the NOVRAM.
When replacing IC25 (address E2), it is necessary to initialize NOVRAM.
For details, please consult the service personnel.

2-9. HOW TO REMOVE A CASSETTE WHEN THE TAPE IS SLACK

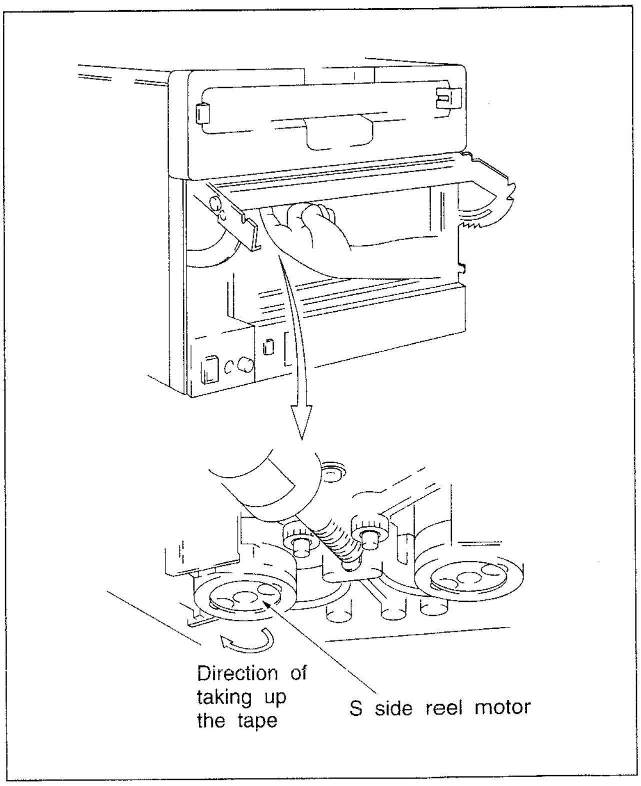
If either the cassette cannot be ejected or the cassette compartment does not rise up due to some trouble or other, switch off and first carry out the following procedures to remove the cassette tape.

(1) Remove the top panels and open the control panel or the blank panel.
(2) Pull out two processor boards, MD-62 and SSP-07 boards from the unit.
(3) Rotate the worm gear on the loading motor by hand in the direction of the arrow and move each guide to the unthreading position (as shown by doted line). The tape will remain at the threading position.



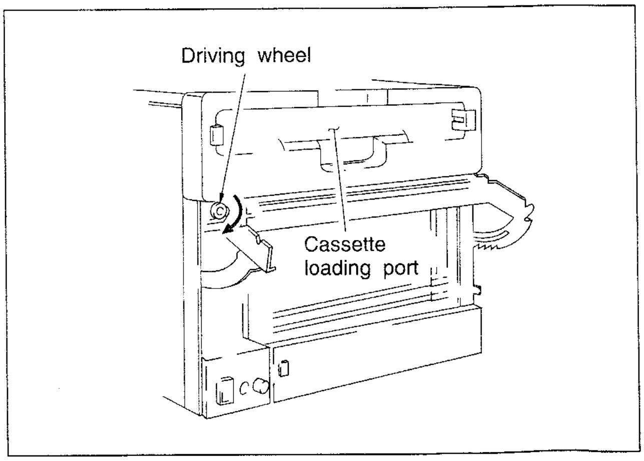
(The figure is for DVR-28.)

(4) Place hand inside the opening at the bottom of the cassette loading port, and rotate the bottom of S side reel motor by hand to take up the tape protruding from the cassette.
At this time, take care not to damage the tape which remains in the unit.

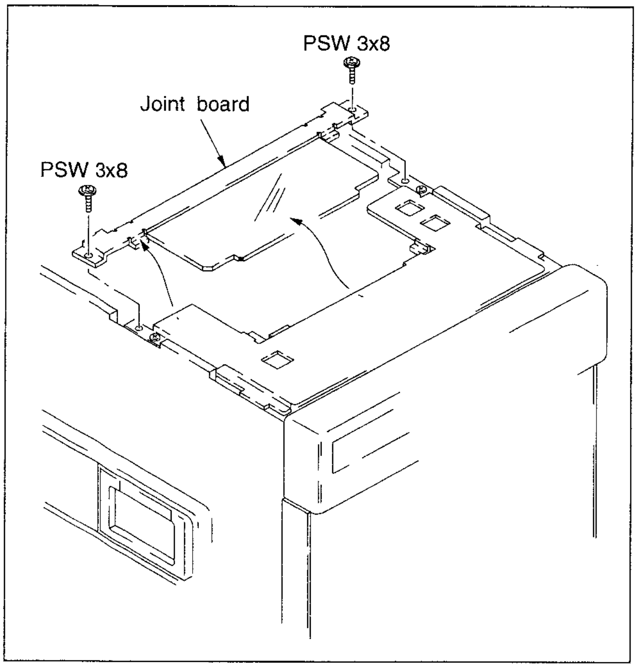


(5) Rotate the driving wheel fully in the clockwise direction by hand. When using the L cassette, the cassette can be taken out from the cassette loading port

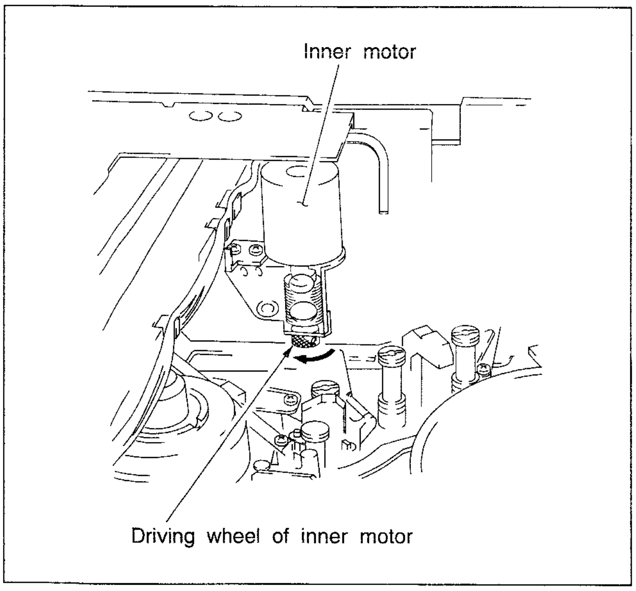
Note: When using the L cassette, perform Step (8). When using the M/S cassette, perform Step (6) through (8).



(6) Remove the two screws (PSW3x8) as shown in the figure and then remove the joint board.


PSW 3x8
Joint board
PSW 3x8

(7) Rotate the driving wheel of the inner motor fully in the direction of the arrow by hand. Take out the cassette tape from the cassette loading port.


Inner motor
Driving wheel of inner motor

(8) Check the cause of the trouble and carry out repair.

Removal of cassette in an emargency

If you want to eject the cassette forcedly, turn off the power. Turn on the power again with pressing the EJECT button and keep pressing the EJECT button for more than 8 seconds. However, the tape or tape transport system may be damaged.

2-10. CLEANING PROCEDURES FOR HEAD CLOGGING

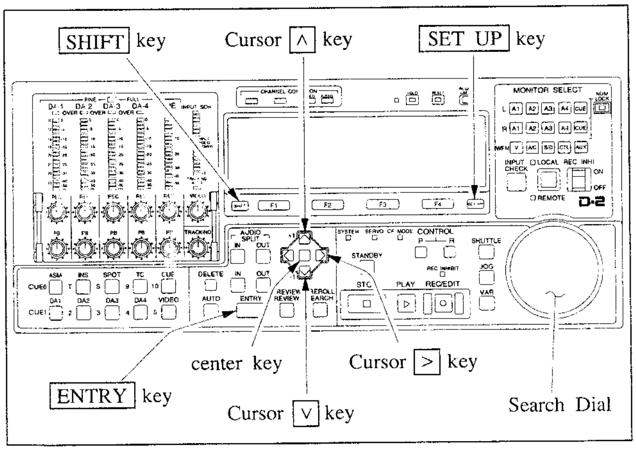
The cleaning roller mounted on the drum block avoids the head lightly clogging. The cleaning roller usually contacts the rotary head automatically at regular intervals, and performs cleaning. This section describes the cleaning procedures when the usual cleaning does not function successfully.

NOTE 1: In cleaning by the following operation, the drum must be rotating (in playing, in standing by, and so on).

NOTE 2: DVR-P28 (NTSC) has not recording and editting functions. When a Control Panel is installed to DVR-P28 (NTSC) , DVR-P28 (NTSC) do not display the menus about them.

BKDV-200/201/202

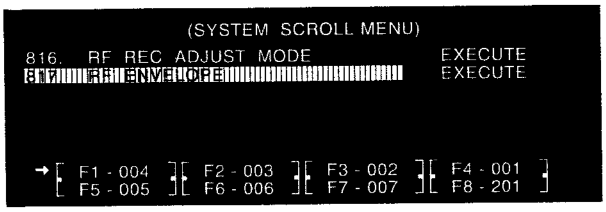
Cleaning Procedures (This figure is for BKDV-201.)



(1) Press the following keys on the control panel.

① Press the SET UP key with the SHIFT key to enter SYSTEM SCROLL menu.

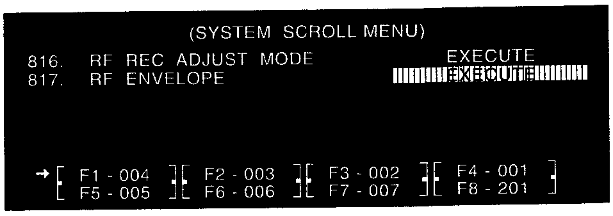
② Press the cursor ∨ key or turn the search dial clockwise, while pressing the ENTRY key with the center key to enter the <TEST> menu.
Then, press the cursor ∨ key or turn the search dial clockwise to select 817. 〔RF ENVELOPE〕 menu. (Fig. 1)



```
                (SYSTEM SCROLL MENU)
816.  RF REC ADJUST MODE                 EXECUTE
817.  RF ENVELOPE                        EXECUTE

 →[ F1 - 004 ][ F2 - 003 ][ F3 - 002 ][ F4 - 001 ]
  [ F5 - 005 ][ F6 - 006 ][ F7 - 007 ][ F8 - 201 ]
```

Fig. 1

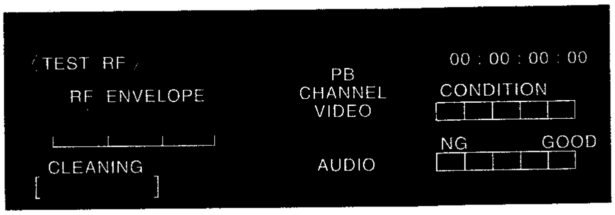
③ Press the cursor > key to select EXECUTE.



```
                (SYSTEM SCROLL MENU)
816.  RF REC ADJUST MODE                 EXECUTE
817.  RF ENVELOPE                        EXECUTE

 →[ F1 - 004 ][ F2 - 003 ][ F3 - 002 ][ F4 - 001 ]
  [ F5 - 005 ][ F6 - 006 ][ F7 - 007 ][ F8 - 201 ]
```

Fig. 2

④ Press the cursor ∧ or ∨ key to enter the menu.
The following display (Fig. 3) is shown.

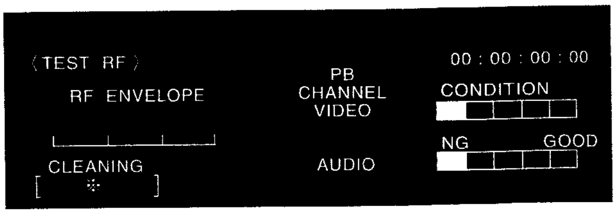


```
<TEST RF>                            00 : 00 : 00 : 00
                          PB
  RF ENVELOPE           CHANNEL      CONDITION
                         VIDEO

                                     NG        GOOD
  CLEANING               AUDIO
 [          ]
```

Fig. 3

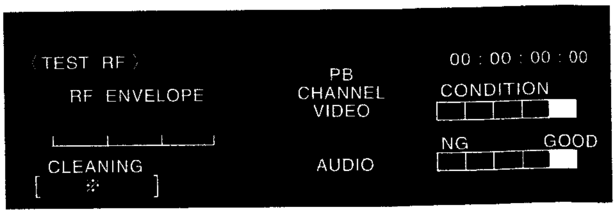
(2) ① When pressing the F1 (CLEANING) key, the cleaning roller cleans the video head repeatedly. When the video head is clogged, NG is displayed on [PB CHANNEL CONDITION] on the display as shown in Fig. 4 (a).

② When, while pressing the F1 (CLEANING) key, the head clog is removed, GOOD is displayed on [PB CHANNEL CONDITION] on the display as shown in Fig. 4 (b).



```
<TEST RF>                            00 : 00 : 00 : 00
                          PB
  RF ENVELOPE           CHANNEL      CONDITION
                         VIDEO

                                     NG        GOOD
  CLEANING               AUDIO
 [    ※    ]
```

Fig. 4(a)



```
<TEST RF>                            00 : 00 : 00 : 00
                          PB
  RF ENVELOPE           CHANNEL      CONDITION
                         VIDEO

                                     NG        GOOD
  CLEANING               AUDIO
 [    ※    ]
```

Fig. 4(b)

* When the cleaning roller is ON, the cleaning light (※ portion) is ON.

③ After that, press the SET UP key to return to the HOME menu.

(3) If, after one minute with F1 pressed, the indication does not return to GOOD, use the cleaning tape or the cleaning piece moistened with alcohol and perform cleaning.

BKDV-101

Cleaning Procedures

(1) Press the TEST key on the Menu select keys and then press the F5 (RF) key on the function control panel.

(2) When pressing the F11 (CLEANING) key, the cleaning roller cleans the video head repeatedly. When the video head is clogged, NG is displayed on [PB CHANNEL CONDITION] on the control panel.
When, while pressing the F11 (CLEANING) key, the head clog is removed, GOOD is displayed on [PB CHANNEL CONDITION] on the control panel.

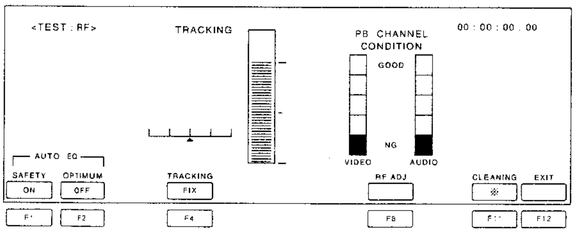

<TEST : RF>
TRACKING
PB CHANNEL CONDITION
00 : 00 : 00 : 00
GOOD
NG
VIDEO
AUDIO
AUTO EQ
SAFETY
OPTIMUM
ON
OFF
TRACKING
FIX
RF ADJ
CLEANING
EXIT
※
F1
F2
F4
F5
F11
F12

Fig. a. The video head is clogged

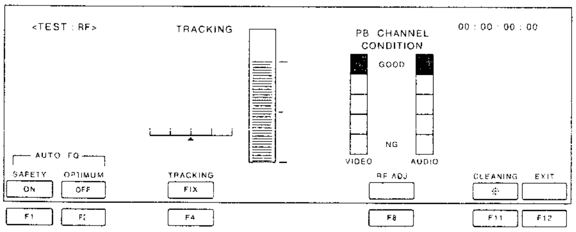

<TEST : RF>
TRACKING
PB CHANNEL CONDITION
00 : 00 : 00 : 00
GOOD
NG
VIDEO
AUDIO
AUTO EQ
SAFETY
OPTIMUM
ON
OFF
TRACKING
FIX
RF ADJ
CLEANING
EXIT
※
F1
F2
F4
F8
F11
F12

Fig. b. The head clog is removed

* When the cleaning roller is ON, the CLEANING light (※ portion) is ON.

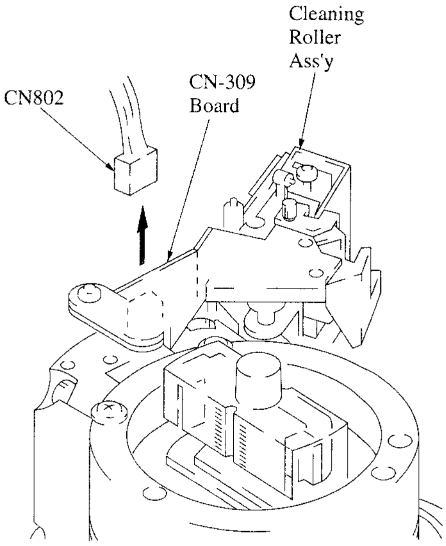
(3) If, after one minute with F11 pressed, the indication does not return to GOOD, use the cleaning tape or the cleaning piece moistened with alcohol and perform cleaning.

Disabling the operation of the cleaning roller

The operation of the cleaning roller can be disabled for checking and adjusting, perform as follows.

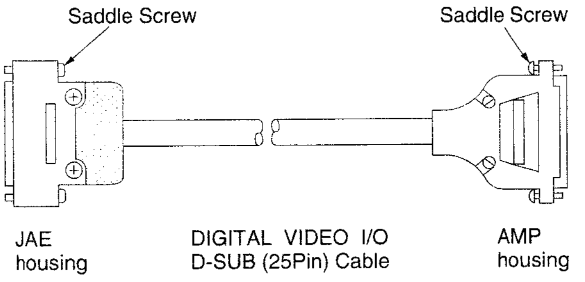
(1) Remove the top panel.

(2) Disconnect the connector CN802 on CN-309 board mounted on the cleaning roller ass'y.

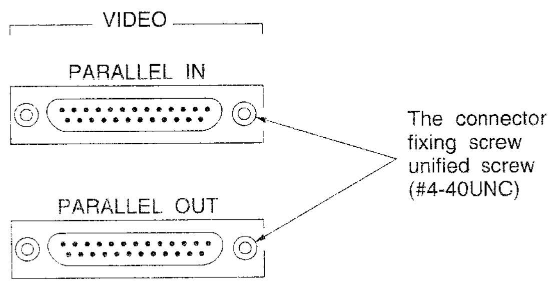

Cleaning Roller Ass'y
CN802
CN-309 Board

2-11. CONNECTING THE CABLE TO THE DIGITAL VIDEO IN/OUT CONNECTORS

The connector fixing screw of the digital parallel video IN/OUT connector which is used in the unit has been standardized as an unified screw (#4-40UNC) by SMPTE.EBU.
There are a few cases that an ISO standard 2.5mm screw instead of an unified screw as a saddle screw (screw for fixing the cable) is used.
Check that unified screw is used as a saddle screw when fixing the VCD cable with the screws. If necessary, replace an ISO standard 2.5mm screw with an unified screw.


Saddle Screw
Saddle Screw
JAE housing
DIGITAL VIDEO I/O D-SUB (25Pin) Cable
AMP housing

Saddle Screw
For AMP housingSONY Part No. : 2-129-710-01
For JAE housingSONY Part No. : 2-129-711-01


VIDEO
PARALLEL IN
PARALLEL OUT
The connector fixing screw unified screw (#4-40UNC)

(The figure is for DVR-28.)

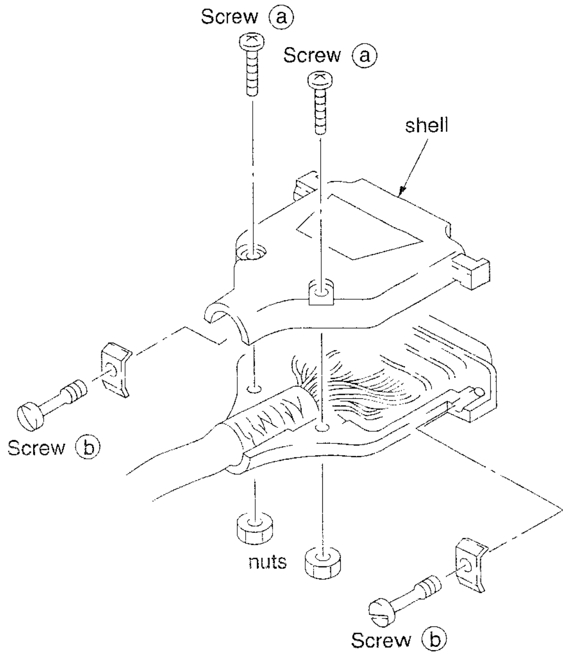
How to Replace a Saddle Screw
(ISO standard 2.5mm screw→ unified screw)

(1) Remove the two screws ⓐ , open the shell of housing.

(2) Replace the two screws ⓑ with the unified screws (#4-40UNC) supplied with the VCD cable.

Note: When the unified screws are not supplied with the VCD cable, please contact your nearest Sony service facility.

(3) When shutting the shell, ensure that the screws ⓐ and nuts do not catch the wire leads.

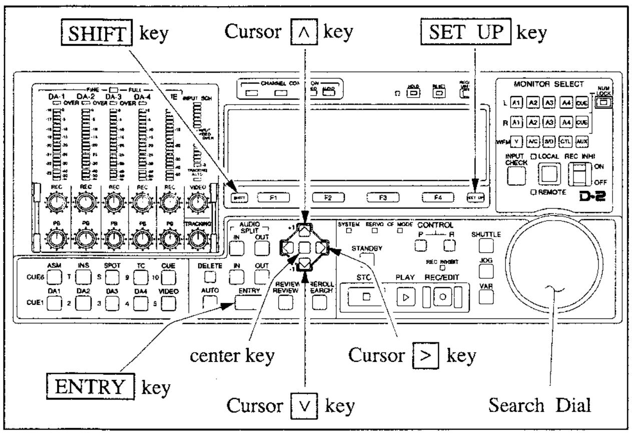

Screw ⓐ
Screw ⓐ
shell
Screw ⓑ
nuts
Screw ⓑ

2-12. SETTING THE USER SET VALUE FOR SYNC PHASE AND SC PHASE

BKDV-200/201/202 (The figure is for BKDV-201.)

The settings for SYNC and SC phase can be stored in the NOVRAM by the following procedure.

NOTE: DVR-P28 (NTSC) has not recording and editting functions.
When a Control Panel is installed to DVR-P28 (NTSC), DVR-P28 (NTSC) do not display the menus about them.

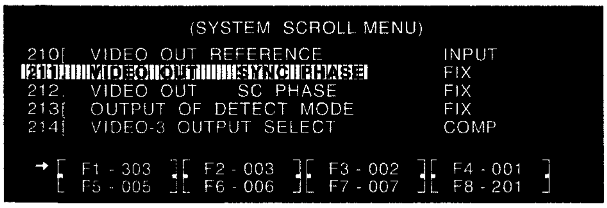


(1) Select VIDEO OUT SYNC PHASE menu or VIDEO OUT SC PHASE menu.
(The figure is for VIDEO OUT SYNC PHASE menu.)

Procedure:

① Press the SET UP key with the SHIFT key to enter SYSTEM SCROLL menu.

② Press the cursor ∨ key or turn the search dial clockwise, while pressing the ENTRY key to select the <VIDEO IN/OUT> menu.
Then, press the cursor ∨ key or turn the search dial clockwise to select 211. 〔VIDEO OUT SYNC PHASE〕 or 212. 〔VIDEO OUT SC PHASE〕.



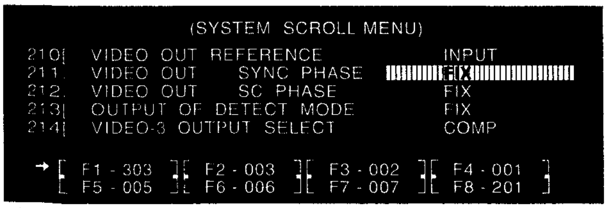
```
                (SYSTEM  SCROLL MENU)
210[  VIDEO OUT REFERENCE              INPUT
211.  VIDEO OUT    SYNC PHASE          FIX
212.  VIDEO OUT    SC PHASE            FIX
213[  OUTPUT OF DETECT MODE            FIX
214[  VIDEO-3 OUTPUT SELECT            COMP

 →[ F1 - 303 ][ F2 - 003 ][ F3 - 002 ][ F4 - 001 ]
  [ F5 - 005 ][ F6 - 006 ][ F7 - 007 ][ F8 - 201 ]
```

Fig. 1 (SYNC PHASE)

(2) Adjust the SYNC or SC phase value.

Procedure:

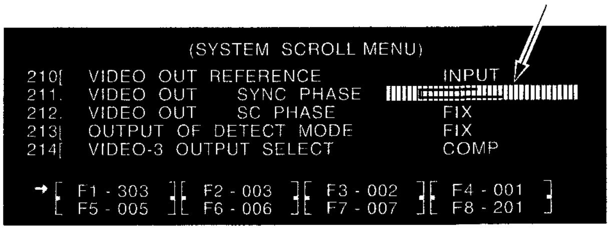
① Press the cursor > key so as to be able to change the data. (Fig. 2)



```
                (SYSTEM  SCROLL MENU)
210[  VIDEO OUT REFERENCE              INPUT
211.  VIDEO OUT    SYNC PHASE          FIX
212.  VIDEO OUT    SC PHASE            FIX
213[  OUTPUT OF DETECT MODE            FIX
214[  VIDEO-3 OUTPUT SELECT            COMP

 →[ F1 - 303 ][ F2 - 003 ][ F3 - 002 ][ F4 - 001 ]
  [ F5 - 005 ][ F6 - 006 ][ F7 - 007 ][ F8 - 201 ]
```

Fig. 2

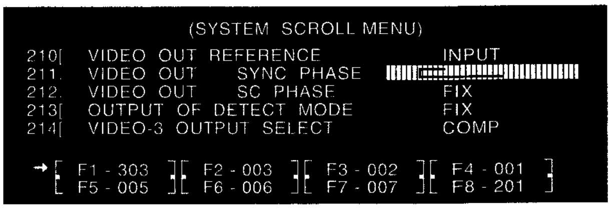
② The part shown in the following figure is usually "FIX." If this setting is changed, press the center key to change the phase value.



```
                (SYSTEM  SCROLL MENU)
210[  VIDEO OUT REFERENCE              INPUT
211.  VIDEO OUT    SYNC PHASE
212.  VIDEO OUT    SC PHASE            FIX
213[  OUTPUT OF DETECT MODE            FIX
214[  VIDEO-3 OUTPUT SELECT            COMP

 →[ F1 - 303 ][ F2 - 003 ][ F3 - 002 ][ F4 - 001 ]
  [ F5 - 005 ][ F6 - 006 ][ F7 - 007 ][ F8 - 201 ]
```

Fig. 3

③ Turn the search dial to adjust the suitable phase. (Fig. 4)



```
                (SYSTEM  SCROLL MENU)
210[  VIDEO OUT REFERENCE              INPUT
211.  VIDEO OUT    SYNC PHASE
212.  VIDEO OUT    SC PHASE            FIX
213[  OUTPUT OF DETECT MODE            FIX
214[  VIDEO-3 OUTPUT SELECT            COMP

 →[ F1 - 303 ][ F2 - 003 ][ F3 - 002 ][ F4 - 001 ]
  [ F5 - 005 ][ F6 - 006 ][ F7 - 007 ][ F8 - 201 ]
```

Fig. 4

④ Press the ENTRY key with the center key.
The setting is memorized.

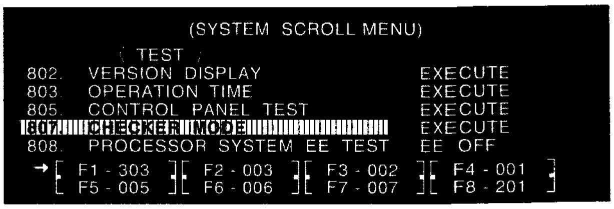
(3) Write the setting as fixed values to NOVRAM.

Procedure:

① Press the cursor < key to stop the adjustable mode.

② Press the cursor ∨ key or turn the search dial clockwise, while pressing the ENTRY key with the center key to enter the <TEST> menu.

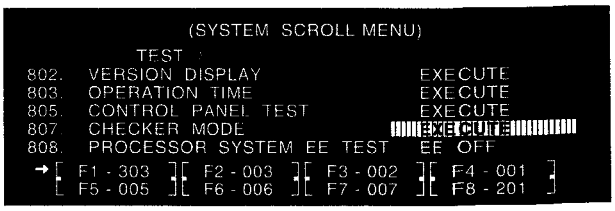
③ Press the cursor ∨ key or turn the search dial clockwise to select 807. 〔CHECKER MODE〕.



```
                (SYSTEM  SCROLL MENU)
        < TEST >
802.  VERSION DISPLAY                  EXECUTE
803.  OPERATION TIME                   EXECUTE
805.  CONTROL PANEL TEST               EXECUTE
807.  CHECKER MODE                     EXECUTE
808.  PROCESSOR SYSTEM EE TEST         EE OFF
 →[ F1 - 303 ][ F2 - 003 ][ F3 - 002 ][ F4 - 001 ]
  [ F5 - 005 ][ F6 - 006 ][ F7 - 007 ][ F8 - 201 ]
```

Fig. 5

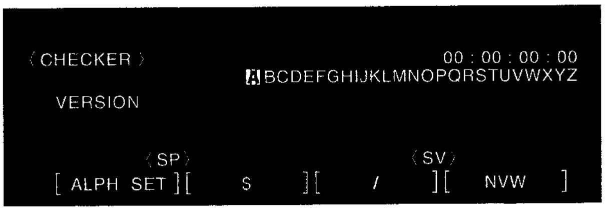
④ Press the cursor > key to select EXECUTE.



```
                (SYSTEM  SCROLL MENU)
        < TEST >
802.  VERSION DISPLAY                  EXECUTE
803.  OPERATION TIME                   EXECUTE
805.  CONTROL PANEL TEST               EXECUTE
807.  CHECKER MODE                     EXECUTE
808.  PROCESSOR SYSTEM EE TEST         EE OFF
 →[ F1 - 303 ][ F2 - 003 ][ F3 - 002 ][ F4 - 001 ]
  [ F5 - 005 ][ F6 - 006 ][ F7 - 007 ][ F8 - 201 ]
```

Fig. 6

⑤ Press the cursor [∧] key to enter the CHECKER mode.



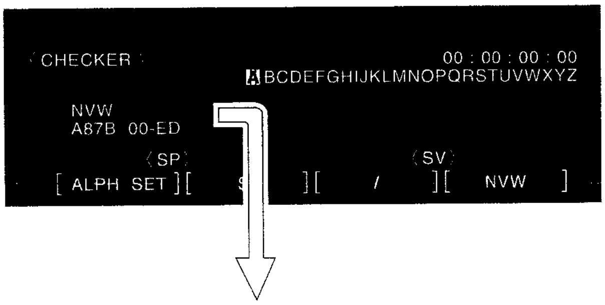
```
〈CHECKER〉                        00 : 00 : 00 : 00
                           ABCDEFGHIJKLMNOPQRSTUVWXYZ
  VERSION

              〈SP〉                 〈SV〉
[ ALPH SET ][   $    ][    /    ][   NVW    ]
```

Fig. 7

⑥ Press the keys on the control panel in the following sequence to enter the NOVRAM write mode.
[F4] (NVW), [SET]

For the operation of the monitor select keys, refer to 〔MONITOR SELECT KEYS OPERATION〕 in the end of this section.

⑦ Whenever the F3 (/) key is pressed, the following addresses are displayed. (Fig. 8)



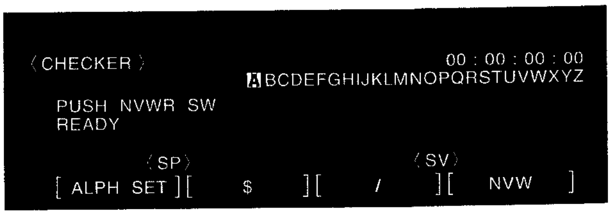
```
〈CHECKER〉                        00 : 00 : 00 : 00
                           ABCDEFGHIJKLMNOPQRSTUVWXYZ
  NVW
  A87B  00-ED
              〈SP〉                 〈SV〉
[ ALPH SET ][         ][    /    ][   NVW    ]
```

	DISPLAY			OPERATION
	CHECK	DATA	NEW DATA	
SYNC	A87B	☐☐	– ☐☐	[/]
	A87C	☐☐	– ☐☐	[/]
SC	A87D	☐☐	– ☐☐	[/]
	A87E	☐☐	– ☐☐	[/]
CHECK SUM	A8FE	☐☐	– ☐☐	[/]
	A8FF	☐☐	– ☐☐	[/]
PUSH NVWR SW:				

Fig. 8

When setting the SYNC phase, A87B and A87C addresses are displayed.
When setting the SC phase, A87D and A87E addresses are displayed.
A8FE and A8FF addresses are CHECK SUM.
If addresses other than the above are displayed, turn the power OFF. Turn the power ON again, and perform (1) through (3).

⑧ Press the [F3] (/) key after checking the addresses on the display, "PUSH NVWR SW" is displayed.
Press S71 (NOVRAM WRITE switch) on SSP-07 board.
Check that "READY" is appeared on the control panel. (Fig. 9)



```
〈CHECKER〉                        00 : 00 : 00 : 00
                           ABCDEFGHIJKLMNOPQRSTUVWXYZ
  PUSH NVWR SW
  READY
              〈SP〉                 〈SV〉
[ ALPH SET ][   $    ][    /    ][   NVW    ]
```

Fig. 9

⑨ After checking, perform either procedure 1 or 2 below.

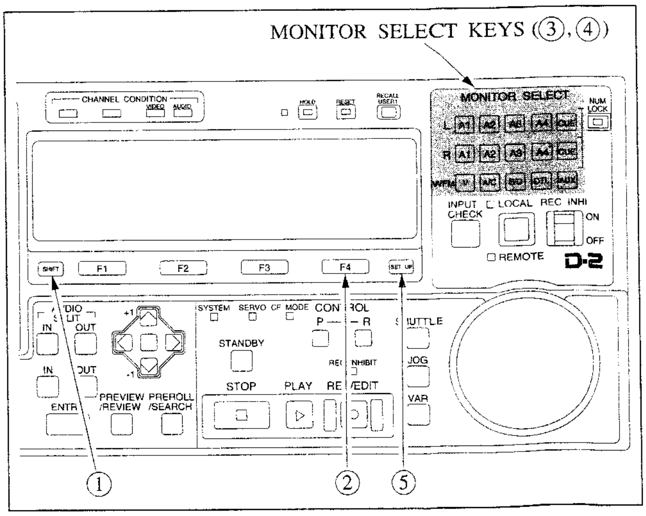
Procedure 1

Turn the power OFF.
Turn the power ON again, and check that the setting has been performed correctly.

Procedure 2

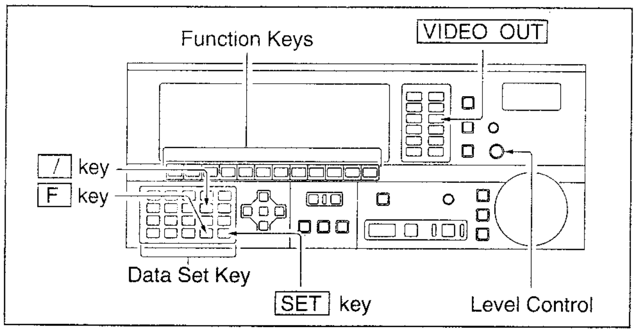
Press the keys on the control panel in the following sequence.
For the operation of the monitor select keys, refer to 〔MONITOR SELECT KEYS OPERATION〕 in the end of this section.

① Press the [SHIFT] key.
② Press the [F4] (=) key.
③ Press the [0] key of the monitor select key.
④ Press the [SET] key of the monitor select key.
Check that the setting has been performed correctly.



BKDV-101

The settings for SYNC and SC phase can be stored in the NOVRAM by the following procedure.

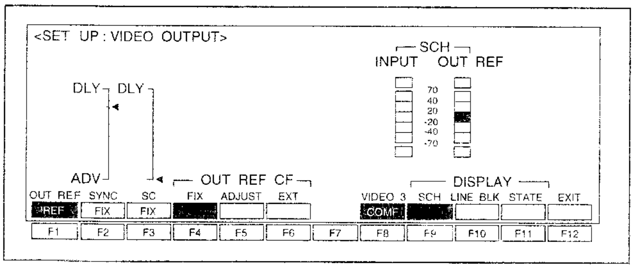

Function Keys
VIDEO OUT
/ key
F key
Data Set Key
SET key
Level Control

(1) Enter the SYNC PHASE menu or SC PHASE menu.

Procedure

Press the keys on the control panel in the following sequence.

VIDEO OUT, F12 (SET UP), F9 (SCH)


<SET UP : VIDEO OUTPUT>
SCH
INPUT OUT REF
DLY DLY
70
40
20
-20
-40
-70
ADV
OUT REF CF
DISPLAY
OUT REF SYNC SC FIX ADJUST EXT
VIDEO 3 SCH LINE BLK STATE EXIT
REF FIX FIX
COMP
F1 F2 F3 F4 F5 F6 F7 F8 F9 F10 F11 F12

(2) Adjust the SYNC or SC phase value.

Setting of the SYNC phase value

Press the F2 (SYNC) key and then adjust the phase with the level control. After adjusting, press the F2 (SYNC) key while pressing the F key on the data set key.

Setting of the SC phase value

Press the F3 (SC) key, and then adjust the phase with the level control. After adjusting, press the F3 (SC) key while pressing the F key on the data set key.

(3) Write these settings as fixed values to NOVRAM.

Procedure

① Press the keys on the control panel in the following sequence.

TEST, F6 (CHECKER), F1 (SP), F10 (NVW), SET

② Whenever the / key is pressed, the following addresses are displayed.

DISPLAY				OPERATION
		DATA	NEW DATA	
SYNC	A87B	☐☐	– ☐☐	/
	A87C	☐☐	– ☐☐	/
SC	A87D	☐☐	– ☐☐	/
	A87E	☐☐	– ☐☐	/
CHECK SUM	A8FE	☐☐	– ☐☐	/
	A8FF	☐☐	– ☐☐	/
	PUSH NVWR SW:			

When setting the SYNC phase, A87B and A87C addresses are displayed.
When setting the SC phase, A87D and A87E addresses are displayed.
A8FE and A8FF addresses are CHECK SUM.
If addresses other than the above are displayed, turn the power OFF. Turn the power ON again, and perform (1) through (3).

(4) Press the / key after checking the addresses on the control panel, "PUSH NVWR SW" is displayed.
Press S71 (NOVRAM WRITE switch) on SSP-07 board.
Check that "READY" appears on the display.
After checking, perform either procedure 1 or 2 below.

Procedure 1

Turn the power OFF.
Turn the power ON again, and check that the setting has been performed correctly.

Procedure 2

Press the keys on the control panel in the following sequence.

F8 (=), 0, SET

Check that the setting has been performed correctly.

2-13. BKDV-103/105/106, BKDV-110/111

BKDV-105/106 SONY SERIAL INTERFACE BOARD

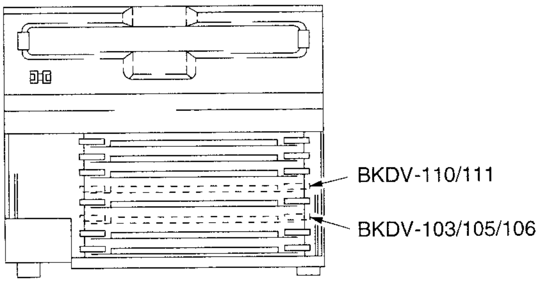
This optional board can send and receive digital video signal and the four channels of digital audio using one BNC cable. But, BKDV-103 has only the send function.
For details, refer to BKDV-103 or BKDV-105/106 Installation and Maintenance Manual.

BKDV-110/111 AUDIO PROGRAM PLAY BOARD

This optional board can perform Audio Program Play in variable extent ±15% as former VTRs (1 inch VTR, etc.).
This board has the following mode as former VTRs (1 inch VTR, etc.).

- Change the pitch according to tape speed.
- Correct the audio pitch.

For details, refer to BKDV-110/111 Installation and Maintenance Manual.



2-14. MONITOR SELECT KEYS OPERATION

A monitor select key of BKDV-200 series control panel is used for input the command, data and so on, in CHECKER mode of TEST menu.
For the key operation, this is shown as follows in this manual.

ex.) Entry F28 in CHECKER Mode.

BKDV-200/201/202 : sheet plane display of the monitor select key
For BKDV-200/201, both the standard and
supplied accessories are applicable.

INPUT CHECK + 5 (F), 2, 8, SET

input alphabet

Equal to ALPHA SET key
(For BKDV-202, LOCAL/REMOTE)

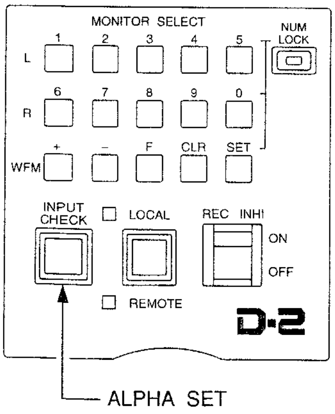
The numeric character and its corresponding alphabetic character are shown in the table below.

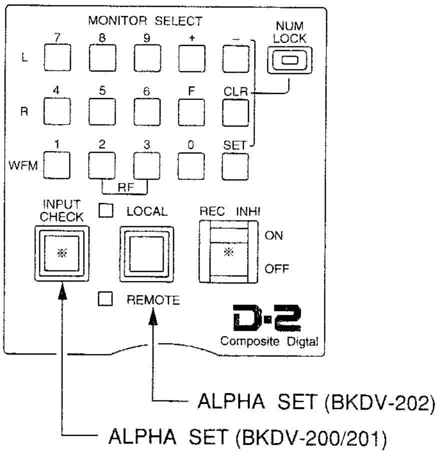
Numeral ↔ alphabet to correspondence chart

1	2	3	4	5	6	7	8	9	0
B	C	D	E	F					A

SET : Used when entering a command or data.
+ : Used as a space key.(Advances to the next address for $ and $$ commands.)
– : Delete one character before the cursor. (Return to the previous address for $ and $$ commands.)
CLR : Not operate.

Monitor Select Key Sheet

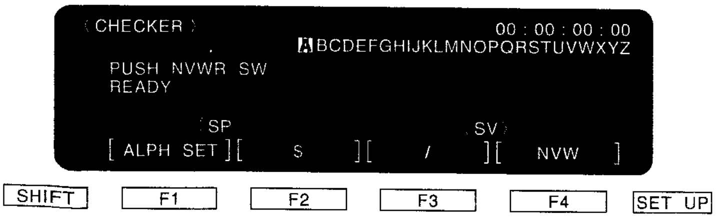

MONITOR SELECT
NUM LOCK
1
2
3
4
5
L
6
7
8
9
0
R
+
–
F
CLR
SET
WFM
INPUT CHECK
LOCAL
REC INHI
ON
OFF
REMOTE
D-2
ALPHA SET


MONITOR SELECT
NUM LOCK
7
8
9
+
–
L
4
5
6
F
CLR
R
1
2
3
0
SET
WFM
RF
INPUT CHECK
LOCAL
REC INHI
ON
OFF
REMOTE
D-2
Composite Digital
ALPHA SET (BKDV-202)
ALPHA SET (BKDV-200/201)

BKDV-200/201 standard

BKDV-200/201 supplied accessories
BKDV-202 (not have ※-mark key)

Note: The alphabet can be input using the second-line alphabets on the display.
ex.) To select "A"...............Select A using the search dial, and press F1 key.



```
〈CHECKER〉                       00 : 00 : 00 : 00
                          ABCDEFGHIJKLMNOPQRSTUVWXYZ
  PUSH NVWR SW
  READY

       〈SP                      〈SV〉
 [ ALPH SET ][    $    ][   /   ][   NVW   ]
```

SHIFT
F1
F2
F3
F4
SET UP

SECTION 3
TEST MENU

FOR BKDV-101

3-1. OUTLINE

The TEST menu is an important item when maintaining, checking, and repairing the unit and is displayed when the control panel TEST key is pressed.
Five of the seven TEST menus (OP TIME menu, RF menu, CHECKER menu, PROC menu and MULTI menu) are described in this section.
For other TEST menus, refer to the Operation Manual.

How to Enter Menu

Press the keys on the control panel in the following sequence.

TEST : The TEST menu is selected.
(F1 to F8 : Select the desired menu.)

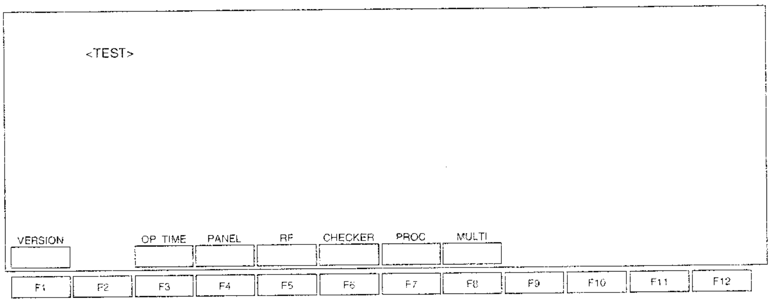


Fig. 3-1. Test Menu Display

Function key	Display	Function
F1	VERSION	Displays ROM versions of the internal circuit boards.
F3	OP TIME	Displays operating hours of the VTR.
F4	PANEL	Checks control panel.
F5	RF	Checks RF output.
F6	CHECKER	Checks servo system and tape path system.
F7	PROC	System EE mode
F8	MULTI	Multi-loop test

Table 3-1. Function of Test Menu

3-2. OP TIME MENU

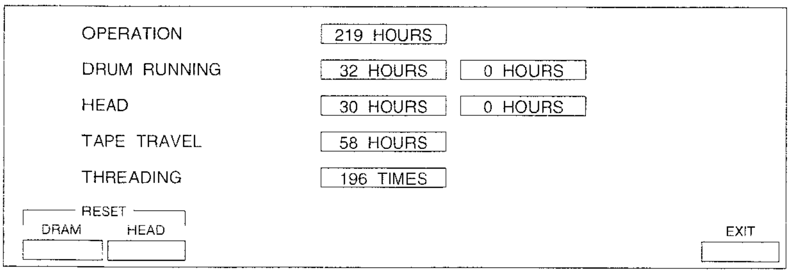
The OP (OPERATION) TIME menu displays the operating hour, head drum rotating hour, tape traveling hour and tape threading / unthreading time.
When performing the periodic check of the unit, check and use the operation hour and the time of cassette threading / unthreading operations.

How to Enter and Exit the Menu

Press the keys on the control panel in the following sequence.
TEST : TEST menu is selected.
F3 (OP TIME) : OP TIME menu is selected.
(Fig. 3-2 OP TIME Menu Display appears on the EL panel.)
F12 (EXIT) : The OP TIME menu is terminated and returns to TEST menu.

Explanation of Display

OPERATTION : Operating hour is displayed.
DRUM RUNNING : Drum running hour and resettable drum running hour are displayed.
HEAD : Head working hour and resettable head working hour are displayed.
TAPE TRAVEL : Tape traveling hour is displayed. (calculated in tape length)
THREADING : The number of cassette threading / unthreading operations are displayed.
(Cassette threading / unthreading is counted as one operation.)



```
OPERATION        219 HOURS
DRUM RUNNING      32 HOURS     0 HOURS
HEAD              30 HOURS     0 HOURS
TAPE TRAVEL       58 HOURS
THREADING        196 TIMES
```

Fig. 3-2. OP TIME Menu Display

The display shows both total hour and resettable time for drum running hour and head working hour.
Press F1 key while holding down the F key to reset the right hand value of drum running hour.
Press F2 key while holding down the F key to reset the right hand value of the head working time.

3-3. RF MENU

◎ mark ; Not Used for DVR-P20/P28 (NTSC)

3-3-1. RF Menu Key Function Directories

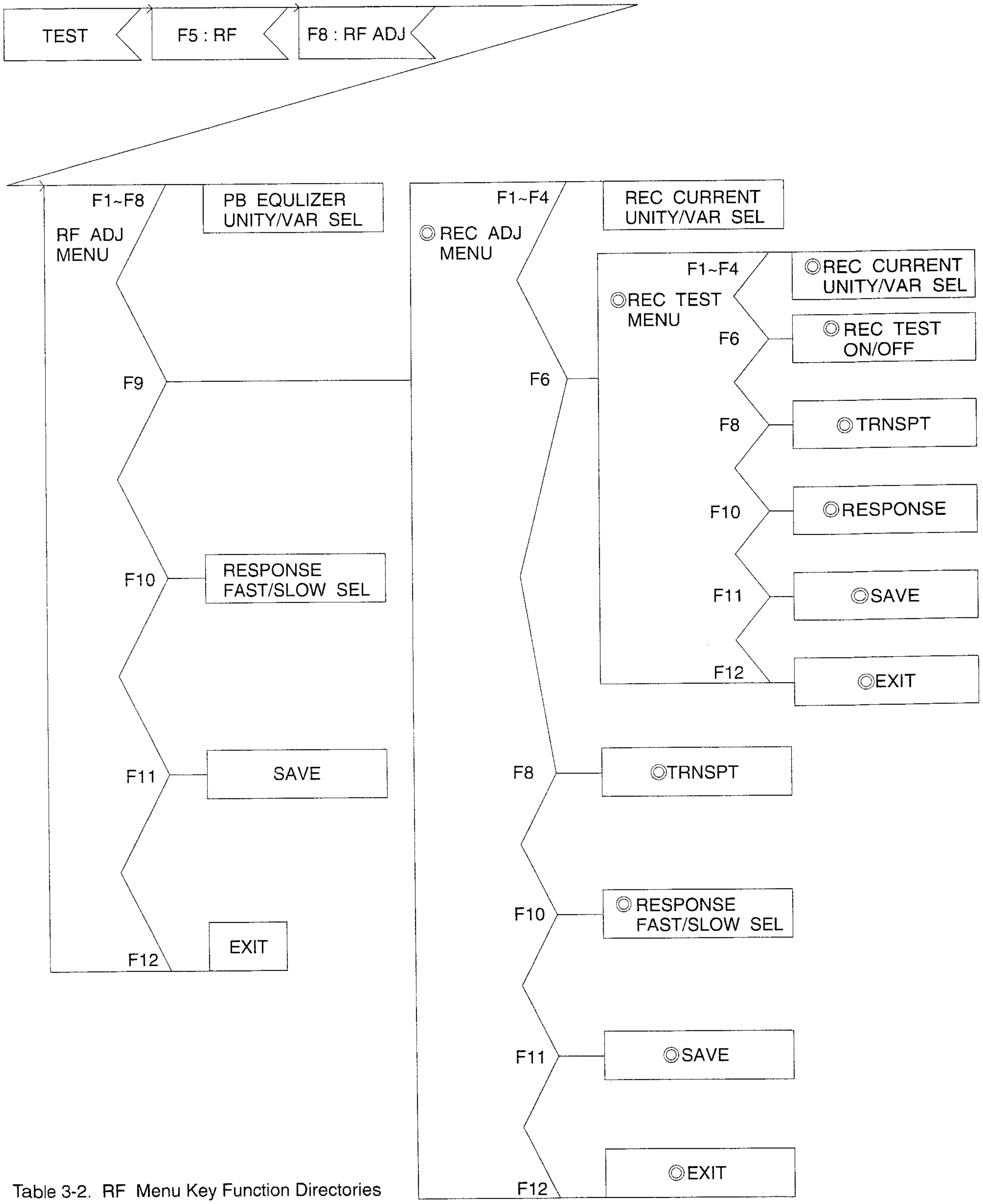

TEST
F5 : RF
F8 : RF ADJ
RF ADJ MENU
F1~F8
PB EQULIZER UNITY/VAR SEL
F9
F10
RESPONSE FAST/SLOW SEL
F11
SAVE
F12
EXIT
◎REC ADJ MENU
F1~F4
REC CURRENT UNITY/VAR SEL
F6
◎REC TEST MENU
F1~F4
◎REC CURRENT UNITY/VAR SEL
F6
◎REC TEST ON/OFF
F8
◎TRNSPT
F10
◎RESPONSE
F11
◎SAVE
F12
◎EXIT
F8
◎TRNSPT
F10
◎RESPONSE FAST/SLOW SEL
F11
◎SAVE
F12
◎EXIT

Table 3-2. RF Menu Key Function Directories

3-3-2. RF Menu

This menu is used for checking and adjusting the RF signal system.

Note : The default value is set when shipped from factory. If the equipment is not adjusted correctly with this menu, good quality video and audio outputs may not be obtained. For details, refer to each section of adjustment.

The way into and out of the menu

Press the keys on the control panel in the following sequence.

TEST : TEST menu is selected.
F5 : RF menu is selected. (Fig. 3-3 RF Menu is displayed on the EL panel.)
(F1, F2, F4, F5, F8 : Select the desired menu.)
F12 : The RF menu is terminated and returns to the TEST menu.

Explanation of Display

TRACKING : This is an RF meter.
PB CHANNEL CONDITION : Error rate of video and audio channels are displayed in 5 levels.

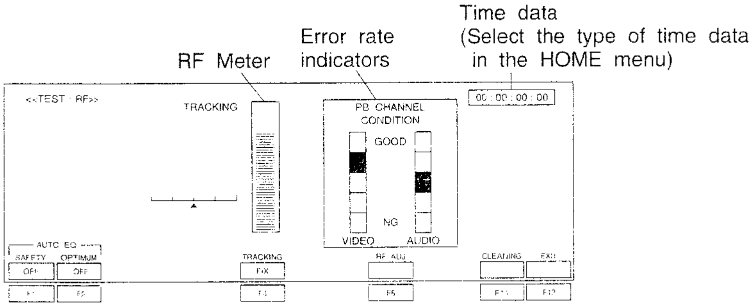

Time data
(Select the type of time data in the HOME menu)
Error rate indicators
RF Meter
<<TEST · RF>>
TRACKING
PB CHANNEL CONDITION
GOOD
NG
VIDEO
AUDIO
00 : 00 : 00 : 00
AUTO EQ
SAFETY
OPTIMUM
OFF
OFF
TRACKING
FIX
RF ADJ
CLEANING
EXIT
F1
F2
F4
F8
F11
F12

Fig. 3-3 RF Menu Display

Function key	Display	Function	Setting
F1	SAFETY	Auto equalization function is maintained.	ON / OFF
F2	OPTIMUM	Optimum equalization according to the head condition is performed.	ON / OFF
F4	TRACKING	Tracking Control	FIX / VAR / AUTO
F8	RF ADJ	RF ADJ menu	–
F11	CLEANING	Cleaning Roller Control	ON/OFF
F12	EXIT	Returns to TEST menu	–

Table 3-3. Function of RF Menu

F1 : SAFETY mode
F2 : OPTIMUM mode

Automatic Equalization

The automatic equalization function corrects changes in equalization parameters which may be caused by certain types of tape or by deterioration of the heads. Two modes are available : SAFETY mode, in which channels whose error rate has become high are corrected during playback, and OPTIMUM mode, in which equalization is performed using a reference tape.

To maintain the automatic equalization function (SAFETY mode)

Press F1 (SAFETY) key to turn this mode on. The error rate of each channel is continuously monitored during playback and equalization is automatically performed when the channel condition of the heads exceeds 2. (The PLAY indicator is lit during the automatic equalization process.)
SAFETY mode remains on until F1 (SAFETY) key is pressed again to select OFF.

To perform optimum equalization according to the head condition (OPTIMUM mode)

① Insert an alignment tape.
② Press F2 (OPTIMUM) key to select ON pressing F key in the data set section.
③ Press the EXECUTE button to perform equalization.
The VTR automatically starts playback and the PLAY lamp blinks during the automatic equalization process.
When equalization obtains the optimum level, the PLAY lamp remains lit and the tape is played back normally.

To write the optimum value as a FIX value to NOVRAM

Stop tape running and set to STANDBY OFF mode. Press F8 (RF ADJ) key and then, press F11 (SAVE) key.

F4 : Tracking Control

Automatic Edit Tracking

As the VTR uses the DT heads as PB heads, it is unnecessary to adjust tracking during playback.
However, the tracking of the recording heads can be automatically corrected when tracking on the tape to be edited is not good, such as in the case of tape recorded on another DVR-20 is used.

① Press F4 (TRACKING) key to select AUTO.
② Perform editing.
("TRACKING AUTO" is displayed on the HOME menu.)
Tracking is automatically adjusted before the tape reaches the IN point during editing.
The SERVO lamp is lit while adjustments are being made.
When tracking adjustment is impossible, a warning message is displayed and the original tracking position is resumed.

To perform edit tracking temporarily

Press F in the data set section together with the PLAY button.
Regardless of the setting of F4 (TRACKING) key, autoçmatic tracking can be performed in any mode.
"TRACK AUTO" is displayed on the HOME menu during automatic edit tracking.
When adjustment has been completed, "TRACK ADJ" is displayed.

Manual Tracking Adjustment

Adjust tracking while referring to the RF meter.
The RF meter indicates the level of the playback RF signals on channel A (recorded with recording head A).

① Press F4 (TRACKING) key to select VAR.
② Turn the control to adjust tracking.
Turn the control until the RF meter indicates the maximum level.
The pointers on the tracking scale show the control position.
When the VTR is used after tracking, keep F4 at the VAR setting.

F8 : **RF ADJ menu**

When pressing this key, RF ADJ menu appears on the EL Panel.
Refer to Section 3-3-3. RF ADJ menu for details.

F11 : **Cleaning Roller Controller**

If heads are clogged, error rate indicators indicate NG.
In this case, keep F11 (CLEANING) key depressed to clean the head.
After cleaning, be sure that the error rate indicators indicate GOOD.
For details, refer to Section 2-10. Cleaning Procedures for Head Clogging.

F12 : **EXIT**

When pressing this key, the RF menu is terminated and returns to the TEST menu.

3-3-3. RF ADJ Menu

◎ mark ; Not Used for DVR-P20/P28 (NTSC)

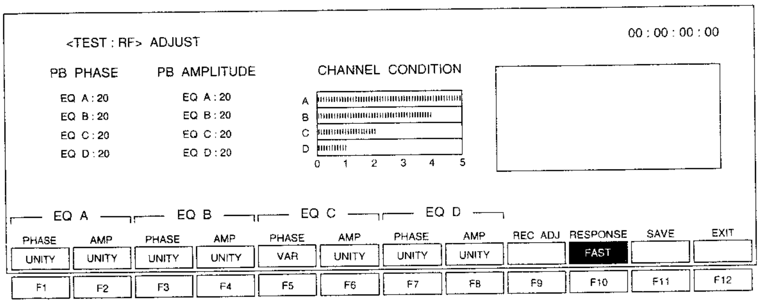
How to Enter and Exit the Menu

Press the keys on the control panel in the following sequence.

TEST : TEST menu is selected.
F5 (RF) : RF menu is selected.
F8 (RF ADJ) : RF ADJ menu is selected. (Fig. 3-4 RF ADJ menu is displayed on the EL panel.)
(F1 to F11 : Select the desired menu.)
F12 (EXIT) : The RF ADJ menu is terminated and returns to the RF menu.

Explanation of Display

PB PHASE : Phase adjustment data of each channel of the PB equalizer is displayed in hexadecimal notation.
PB AMPLITUDE : PB amplitude adjustment data of each channel is displayed in hexadecimal notation.
CHANNEL CONDITION : Error rate of each channel is displayed.



<TEST : RF> ADJUST
00 : 00 : 00 : 00

PB PHASE
EQ A : 20
EQ B : 20
EQ C : 20
EQ D : 20

PB AMPLITUDE
EQ A : 20
EQ B : 20
EQ C : 20
EQ D : 20

CHANNEL CONDITION
A
B
C
D
0
1
2
3
4
5
EQ A
EQ B
EQ C
EQ D
PHASE
AMP
PHASE
AMP
PHASE
AMP
PHASE
AMP
REC ADJ
RESPONSE
SAVE
EXIT
UNITY
UNITY
UNITY
UNITY
VAR
UNITY
UNITY
UNITY
FAST
F1
F2
F3
F4
F5
F6
F7
F8
F9
F10
F11
F12

Fig. 3-4 RF ADJ Menu Display

Function key	Display	Function	Setting
F1	EQ A PHASE	Equalizer CH-A Phase Adjustment	UNITY / VAR
F2	EQ A AMP	Equalizer CH-A Frequency Response Characteristic Adjustment	UNITY / VAR
F3	EQ B PHASE	Equalizer CH-B Phase Adjustment	UNITY / VAR
F4	EQ B AMP	Equalizer CH-B Frequency Response Characteristic Adjustment	UNITY / VAR
F5	EQ C PHASE	Equalizer CH-B Frequency Response Characteristic Adjustment	UNITY / VAR
F6	EQ C AMP	Equalizer CH-C Frequency Response Characteristic Adjustment	UNITY / VAR
F7	EQ D PHASE	Equalizer CH-D Phase Adjustment	UNITY / VAR
F8	EQ D AMP	Equalizer CH-D Frequency Response Characteristic Adjustment	UNITY / VAR
◎ F9	REC ADJ	Selection of REC ADJ Menu	—
F10	RESPONSE	Error Rate Display Mode Selection	FAST / SLOW
F11	SAVE	Saving RF Control Data	—
F12	EXIT	Termination of RF ADJ Menu	—

Table 3-4. Function of RF ADJ Menu

F1 : Equalizer CH-A Phase Adjustment
F2 : Equalizer CH-A Frequency Response Characteristic Adjustment
F3 : Equalizer CH-B Phase Adjustment
F4 : Equalizer CH-B Frequency Response Characteristic Adjustment
F5 : Equalizer CH-C Phase Adjustment
F6 : Equalizer CH-C Frequency Response Characteristic Adjustment
F7 : Equalizer CH-D Phase Adjustment
F8 : Equalizer CH-D Frequency Response Characteristic Adjustment

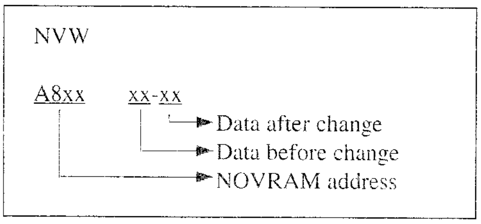
To adjust a specific channel : Select the channel desired by pressing F1 to F8.
Select UNITY / VAR to VAR. Make adjustment.
(Pressing F1 key to F8 key again, selects again the channel.)
For details, refer to Section 13. RF Signal System Adjustment.

F9 : REC ADJ (This menu is not necessary for DVR-P20/P28 NTSC.)
When pressing this key, ADJUST-REC menu is selected.
For details, refer to Section 3-3-4. ADJUST-REC Menu.

F10 : RESPONSE
This key is used for selecting a response speed for the CHANNEL CONDITION display (error rate indication of each channel).
Whenever this key is pressed, response speed setting is changed from "FAST" to "SLOW" or vice versa.

F11 : SAVE
When this key is pressed, the control data set in the menu is transferred to the nonvolatile memory (NOVRAM).
Data changed by the equalizer phase adjustment and the equalizer frequency response characteristic adjustment can not be transfer to NOVRAM as it is.
The new values are set for UNITY, so the data is transferred.
Data transfer is performed by the following procedure.

1. Press F11 (SAVE) key. The following message appears in the message area at the right side of the EL panel.



NVW

A8xx xx-xx

2. Push / key until the message "PUSH NVWR SW" appears in the message area.
   To cancel it during the operation, press SET key.
3. After the message "PUSH NVWR SW" appears in the message area, press the NVWR SW (S71) on SP-15 or SSP-07 board.
   Data transfer begins.
4. When the data has been transferred, "READY" appears in the message area.
5. Data has been transferred. When the unit is powered ON again, UNITY setting is changed.

F12 : EXIT
When pressing this key, the RF ADJ menu is terminated and returns to the RF menu.

3-3-4. ADJUST-REC Menu (This menu is not necessary for DVR-P20/P28 NTSC.)

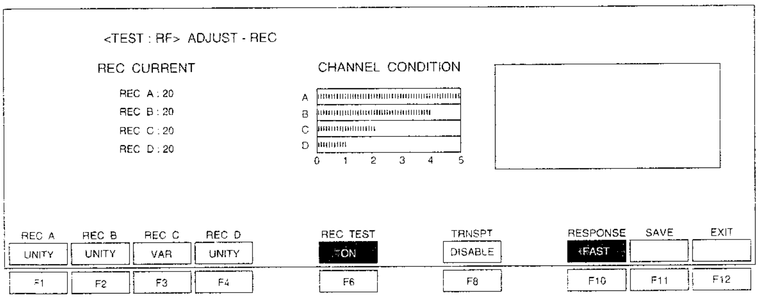
How to Enter and Exit the Menu

Press the following keys on the control panel.

TEST : TEST menu is selected.
F5 (RF) : RF menu is selected.
F8 (RF ADJ) : RF ADJ menu is selected.
F9 (REC ADJ) : REC ADJ menu is selected.
Fig. 3-5. ADJUST-REC menu is displayed on the EL panel.
(F1 to F11 : Select the desired menu.)
F12 (EXIT) : The ADJUST-REC menu is terminated and returns to the RF ADJ menu.

Explanation of Display

REC CURRENT : Recording current adjustment data of each channel is displayed in hexadecimal notation.
CHANNEL CONDITION : Error rate of each channel is displayed.
MESSAGE INDICATION : The message corresponding to the equipment state is displayed.



<TEST : RF> ADJUST - REC

REC CURRENT

REC A : 20
REC B : 20
REC C : 20
REC D : 20

REC A UNITY
REC B UNITY
REC C VAR
REC D UNITY
REC TEST ON
TRNSPT DISABLE
RESPONSE FAST

Fig. 3-5. ADJUST-REC Menu Display

Function key	Display	Function	Setting
F1	REC A	CH-A Recording Current Adjustment	UNITY / VAR
F2	REC B	CH-B Recording Current Adjustment	UNITY / VAR
F3	REC C	CH-C Recording Current Adjustment	UNITY / VAR
F4	REC D	CH-D Recording Current Adjustment	UNITY / VAR
F6	REC TEST	REC TEST Menu	ON / OFF
F8	TRNSPT	ON / OFF of Servo System	ENABLE / DISABLE
F10	RESPONSE	Error Rate display mode selection	FAST / SLOW
F11	SAVE	RF Control Data Save	—
F12	EXIT	Returns to the RF ADJ menu.	

Table 3-5. Function of ADJUST-REC Menu

F1 : CH-A Recording Current Adjustment
F2 : CH-B Recording Current Adjustment
F3 : CH-C Recording Current Adjustment
F4 : CH-D Recording Current Adjustment

To adjust a specific channel : Select the channel desired by pressing F1 to F4.
Select VAR of UNITY / VAR. Make adjustment.
(Pressing F1 key to F4 key again, selects again the channel.)
For details, refer to Section 13. RF Signal System Adjustment.

F6 : REC TEST

When this key is pressed while F8 (TRNSPT) key is shown as DISABLE, the REC TEST mode is set and REC TEST display can be selected ON or OFF.

F8 : TRANSPORT

When pressing this key, indication is changed from ENABLE to DISABLE and Fig. 3-5 ADJUST REC Menu is displayed on the EL panel. And then, "READY FOR REC TEST" message is displayed.
When DISABLE is displayed, servo system is disabled and the VTR is ready to enter the REC TEST menu.
If this key is pressed while a cassette is threading, an "EJECT CASSETTE" message is displayed on the EL panel.

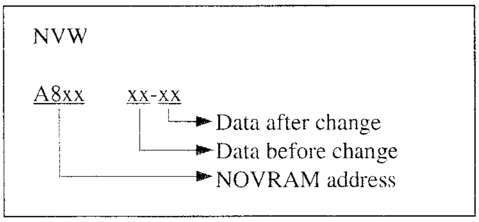
F10 : RESPONSE

This key is used for selecting a response speed for the CHANNEL CONDITION display (error rate indication of each channel).
Whenever this key is pressed, response speed setting is changed from "FAST" to "SLOW" or vice versa.

F11 : SAVE

When this key is pressed, the control data set in the menu is transferred to the nonvolatile memory (NOVRAM).
Data changed by the equalizer phase adjustment and the equalizer frequency response characteristic adjustment can not be transfer to NOVRAM as it is.
The new values are set for UNITY, so the data is transferred.
Data transfer is performed by the following procedure.

1. Press F11 (SAVE) key. The following message appears in the message area at the right side of the EL panel.



```
NVW

A8xx    xx-xx
```

2. Push / key until the message "PUSH NVWR SW" appears in the message area. To cancel it during the operation, press SET key.
3. After the message "PUSH NVWR SW" appears in the message area, press the NVWR SW (S71) on SP-15 or SSP-07 board. Data transfer begins.
4. When the data has been transferred, "READY" appears in the message area.
5. Data has been transferred. When the unit is powered ON again, UNITY setting is changed.

3-3-5. REC TEST Menu (This menu is not necessary for DVR-P20/P28 NTSC.)

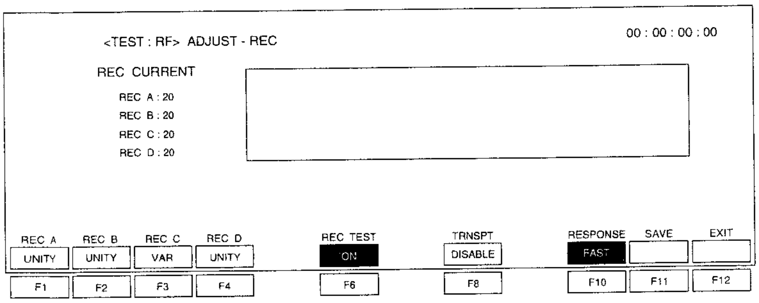
How to Enter and Exit the Menu

Press the keys on the control panel in the following sequence.

TEST : TEST menu is selected.
F5 (RF) : RF menu is selected.
F8 (RF ADJ) : RF ADJ menu is selected.
F9 (REC ADJ) : REC ADJ menu is selected.
F8 (TRNSPT) :
F6 (REC TEST): The REC TEST menu is selected.

Explanation of Display

REC CURRENT : Recording current adjustment data of each channel is displayed in hexadecimal notation.
CHANNEL CONDITION : Error rate of each channel is displayed.
MESSAGE INDICATION : The message corresponding to the equipment state is displayed.



<TEST : RF> ADJUST - REC
00 : 00 : 00 : 00

REC CURRENT
REC A : 20
REC B : 20
REC C : 20
REC D : 20

Fig. 3-6 REC TEST Menu Display

F8 : TRANSPORT

When pressing this key, indication is changed from ENABLE to DISABLE and Fig. 3-6 REC TEST Menu is displayed on the EL panel. And then, "READY FOR REC TEST" message is displayed.
When DISABLE is displayed, servo system is disabled and the VTR is ready to enter the REC TEST menu.
If this key is pressed while a cassette is threading, an "EJECT CASSETTE" message is displayed on the EL panel.

F6 : REC TEST

When this key is pressed while F8 (TRNSPT) key is shown as DISABLE, the REC TEST mode is set and REC TEST display can be selected ON or OFF.

F12 : EXIT

This key is used to return to the RF ADJ menu.
After completing REC TEST, press this key. The following message is displayed.

> May the DRUM be rotated ?
> If yes, press EXIT?

Check that the DRUM is rotated. And then press the F12 (EXIT) key again.

3-3-6. Message Flowchart (◎ mark ; Not Used for DVR-P20/P28 NTSC)

No.	Message or Menu	Key operation	Condition	DISTINATION
①	HOME Menu	TEST	———	②
②	TEST Menu	RF	———	③
		HOME	———	①
③	RF Menu	RF ADJ	———	④
		EXIT	———	②
④	RF ADJ Menu (1)	SAVE	———	⑤
		◎REC ADJ	———	⑥
		EXIT	———	③
⑤	SAVE Message	EXIT	Come from ④	④
			Come from ⑥	⑥
			Come from ⑪	⑪
⑥	◎REC ADJ Menu	◎TRNSPT	◎CASSETTE IN	⑦
			◎No CASSETTE	⑧
		◎SAVE	———	⑤
		◎EXIT	———	④
⑦	"EJECT CASSETTE"	EJECT	———	⑧
		TRNSPT, SAVE	———	⑨
		EXIT	———	⑩
⑧	"READY FOR REC-TEST"	TRNSPT, SAVE	———	⑨
		EXIT	———	⑩
⑨	"This key is disable. Press EXIT for SAVE."	◎REC TEST	CASSETTE IN	⑦
			No CASSETTE	⑧
		EXIT	———	⑩
⑩	"May the DRUM be rotated? If yes, press EXIT again."	EXIT	———	⑪
⑪	RF ADJ Menu (2)	TRNSPT	CASSETTE IN	⑦
			No CASSETTE	⑧
		SAVE	———	⑤
		EXIT	———	⑫
⑫	"SYSTEM STOPPED PLEASE REPOWER TO ESCAPE."	SW OFF		

3-4. PROC MENU

This menu is used to check and adjust the video signal system and audio signal system of the equipment.

How to Enter and Exit the Menu

Press the keys on the control panel in the following sequence.

TEST : TEST menu is selected.
F7 (PROC) : PROC menu is selected.
(Fig. 3-5 PROC menu is displayed on the EL panel.)
F12 (EXIT) : The PROC menu is terminated and returns to TEST menu.

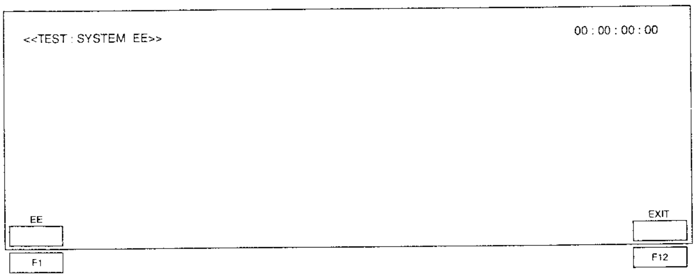


Fig. 3-7. PROC Menu Display

Press the F1 (EE) key toggles between ON and OFF.
ON : The (EE) ON setting is used to check the EE output signal (SYSTEM EE) of the video signal system and the audio signal system of the equipment. If other menu is entered, it is switched to OFF automatically.

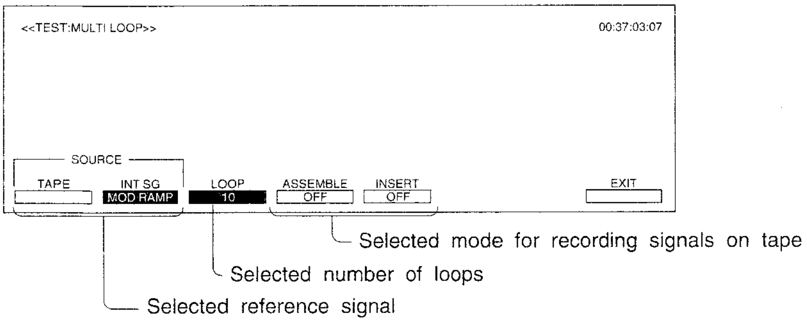
OFF : Check normal signal.

3-5. MULTI-LOOP TEST

When A / D or D / A conversion is repeatedly performed during editing, video signals gradually deteriorate and distortion in creases.
In order to minimize this distortion, a dummy loop circuit which is the same as the analog dubbing process can be created and the video signals passed through the circuit 5, 10, or 20 times, to adjust the set-up level, video level, chroma level and hue.

How to Enter and Exit the Menu

TEST : TEST menu is selected.
F8 (MULTI) + F key : Multi-loop test is selected.
(Fig. 3-8 Multi-loop test is displayed on the EL panel.
F12 (EXIT) : The Multi-loop test is terminated and returns to TEST menu.


<<TEST:MULTI LOOP>>
00:37:03:07
SOURCE
TAPE
INT SG
MOD RAMP
LOOP
10
ASSEMBLE
OFF
INSERT
OFF
EXIT

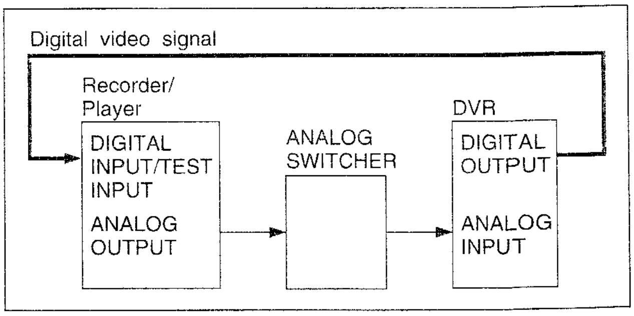
Selected mode for recording signals on tape
Selected number of loops
Selected reference signal

Fig. 3-8 Multi-loop Test Display

Four types of tests are available in Multi-loop test mode.

- When adjusting without recording on the tape using INT SG as the reference signal.
- When adjusting while recording on the tape using INT SG as the reference signal.
- When adjusting without recording on the tape using signals recorded on the tape.
- When adjusting while recording on the tape using signals recorded on the tape.

NOTE : To loop two units using the DVR-10/18/20/28, Set S4-8 on the PR-157/163 board to ON.
V jitters on the monitor screen will be reduced.
This setting is not necessary for DVR-P20/P28.
S4-8 of DVR-P20/P28 is set to ON, when shipped from factory.


Digital video signal
Recorder/ Player
DIGITAL INPUT/TEST INPUT
ANALOG OUTPUT
ANALOG SWITCHER
DVR
DIGITAL OUTPUT
ANALOG INPUT

Sample Configuration for Multi-loop Test

3-5-1. When adjusting without recording on the tape using INT SG as the reference signal

◎ mark ; Not Used for DVR-P20/P28 (NTSC)

① Connect the ANALOG OUTPUT VIDEO connector output signal to the ANALOG VIDEO INPUT connector. When a switcher is included in this adjustment, the output signal should be passed through the switcher and then sent to the ANALOG VIDEO INPUT connector.

② Select TEST menu. Press the [F] key and [F8] key simultaneously to enter the TEST : MULTI LOOP menu. After this menu is entered, the signal that is selected by F1 or F2 becomes the input signal regardless of the VIDEO : INPUT menu's F7 : VIDEO setting. This setting remains after the power is turned off.

③ Select a desired signal from F2 : INS SG.
Output signal can be altered by first selecting INT SG and çthen press the [F2] key.
(The signal source that is selected by this setting does not affect VIDEO IN.)
When the unit is shipped from factory, MODULATED RAMP is selected.

④ Select a desired number of repetition times of signal looping by pressing F3 : LOOP. The loop that is mentioned here consists of an electrical system having the same characteristics as that of analog dubbing. VIDEO OUT of the system is connected to VIDEO IN to configure an system where the signal is circulated at the rate of one generation per every field.

⑤ Start the MULTI LOOP TEST by pressing the EXECUTE button.
During execution of MULTI LOOP TEST, the five lamps of ENTRY IN, ENTRY OUT, EXECUTE, PREROLL, and SEARCH light on sequentially in clockwise direction. At the bottom left of screen, a bar graph showing the loop times is superimposed.

⑥ VIDEO OUTPUT menu is entered to execute the various adjustments.

⑦ The MULTI LOOP TEST is terminated by pressing a tape transport function button such as STOP, PLAY, etc.
It is terminated when a tape transport function command is given from REMOTE.

◎ ⑧ By selecting F4 : ASSEMBLE or F5 : INSERT and pressing the REC / EDIT button during execution of a MULTI LOOP TEST, tape can be recorded. (See Section 3-5-2.)

⑨ After completing the adjustment, the input signal to the ANALOG VIDEO INPUT connector should be reconnected to an ordinary signal.

3-5-2. When adjusting while recording on the tape using INT SG as the reference signal

(Not Necessary for DVR-P20/P28 NTSC.)

① Connect the ANALOG OUTPUT VIDEO connector output signal to the ANALOG VIDEO INPUT connector. When a switcher is included in this adjustment, the output signal should be passed through the switcher and then sent to the ANALOG VIDEO INPUT connector.

② Select TEST menu. Press the $\boxed{F}$ key and $\boxed{F8}$ key simultaneously to enter the TEST : MULTI LOOP menu.
After this menu is entered, the signal that is selected by F1 or F2 becomes the input signal regardless of the VIDEO : INPUT menu's F7 : VIDEO setting. This setting remains after the power is turned off.

③ Select a desired signal from F2 : INT SG.
Output signal can be altered by first selecting INT SG and then press the $\boxed{F2}$ key.
(The signal source that is selected by this setting does not affect VIDEO IN.)
When the unit is shipped from factory, MODULATED RAMP is selected.

④ Select a desired number of repetition times of signal looping by pressing F3:LOOP. The loop that is mentioned here consists of an electrical system having the same characteristics as that of analog dubbing. VIDEO OUT of the system is connected to VIDEO IN to configure an system where the signal is circulated at the rate of one generation per every field.

⑤ Select either the F4 : ASSEMBLE or F5 : INSERT mode. When CRASH REC is desired, this selection is not required.

⑥ Thread a tape.

⑦ By pressing simultaneously the REC / EDIT button (ASSEMBLE or INSERT), or REC / EDIT and PLAY (CRASH REC), MULTI LOOP TEST is initiated. When ASSEMBLE or INSERT mode is selected, a series of PREROLL, PLAY and REC operations are automatically executed so that the tape position where the REC / EDIT buttons are pressed becomes the record starting position.
During execution of MULTI LOOP TEST, the five lamps of ENTRY IN, ENTRY OUT, EXECUTE, PREROLL, and SEARCH light on sequentially in clockwise direction.
At the bottom left of screen, a bar graph showing the loop times is superimposed.

⑧ VIDEO OUTPUT menu is entered to execute the various adjustments.

⑨ The MULTI LOOP TEST is terminated by pressing a tape transport function button such as STOP, PLAY, etc.
It is terminated when a tape transport function command is given from REMOTE.

⑩ After completing the adjustment, the input signal to the ANALOG VIDEO INPUT connector should be reconnected to an ordinary signal.

3-5-3. When adjusting without recording on the tape using signals recorded on the tape

◎ mark ; Not Used for DVR-P20/P28 (NTSC)

① Connect the ANALOG OUTPUT VIDEO connector output signal to the ANALOG VIDEO INPUT connector.
When a switcher is included in this adjustment, the output signal should be passed through the switcher and then sent to the ANALOG VIDEO INPUT connector.

② Install the prerecorded tape that has the recorded signal to be used as the reference signal.

③ Select TEST menu. Press the [F] key and [F8] key simultaneously to enter the TEST : MULTI LOOP menu.
After this menu is entered, the signal that is selected by F1 or F2 becomes the input signal regardless of the VIDEO : INPUT menu's F7 : VIDEO setting. This setting remains after the power is turned off.

④ Select TAPE by pressing the [F1] key.

⑤ Select a desired number of repetition times of signal looping by pressing F3 : LOOP. The loop that is mentioned here consists of an electrical system having the same characteristics as that of analog dubbing. VIDEO OUT of the system is connected to VIDEO IN to configure an system where the signal is circulated at the rate of one generation per every field.

⑥ Find picture of a desired signal with SHUTTLE, JOG, PLAY, etc.

⑦ Start the MULTI LOOP TEST by pressing the EXECUTE button.
The loop is configured with the signal recorded on tape that is threaded on equipment when EXECUTE button is pressed, as the first generation signal (being frozen).
During execution of MULTI LOOP TEST, the five lamps of ENTRY IN, ENTRY OUT, EXECUTE, PREROLL, and SEARCH light on sequentially in clockwise direction. At the bottom left of screen, a bar graph showing the loop times is superimposed.

⑧ VIDEO OUTPUT menu is entered to execute the various adjustments.

◎ ⑨ By pressing the REC / EDIT button during execution of a MULTI LOOP TEST, signal can be recorded on tape.
(See Section 3-5-4.)

⑩ The MULTI LOOP TEST is terminated by pressing a tape transport function button such as STOP, PLAY, etc.
It is terminated when a tape transport function command is given from REMOTE.

⑪ After completing the adjustment, the input signal to the ANALOG VIDEO INPUT connector should be reconnected to an ordinary signal.

3-5-4. When adjusting while recording on the tape using signals recorded on the tape

(Not Necessary for DVR-P20/P28 NTSC.)

① Connect the ANALOG OUTPUT VIDEO connector output signal to the ANALOG VIDEO INPUT connector.
When a switcher is included in this adjustment, the output signal should be passed through the switcher and then sent to the ANALOG VIDEO INPUT connector.

② Install the prerecorded tape that has the recorded signal to be used as the reference signal.

③ Select TEST menu. Press the [F] key and [F8] key simultaneously to enter the TEST : MULTI LOOP menu.
After this menu is entered, the signal that is selected by F1 or F2 becomes the input signal regardless of the VIDEO : INPUT menu's F7 : VIDEO setting. This setting remains after the power is turned off.

④ Select TAPE by pressing the [F1] key.

⑤ Select a desired number of repetition times of signal looping by pressing F3 : LOOP. The loop that is mentioned here consists of an electrical system having the same characteristics as that of analog dubbing. VIDEO OUT of the system is connected to VIDEO IN to configure an system where the signal is circulated at the rate of one generation per every field.

⑥ Find picture of a desired signal with SHUTTLE, JOG, PLAY, etc.

⑦ Select either the F4 : ASSEMBLE or F5 : INSERT mode. When F1 : TAPE is selected, CRASH REC is inhibited.

⑧ By pressing the REC / EDIT button, MULTI LOOP TEST is initiated.
A series of PREROLL, PLAY and REC operations are automatically executed so that the tape position where the REC / EDIT buttons are pressed becomes the record starting position. During execution of MULTI LOOP TEST, the five lamps of ENTRY IN, ENTRY OUT, EXECUTE, PREROLL, and SEARCH light on sequentially in clockwise direction. At the bottom left of screen, a bar graph showing the loop times is superimposed.

⑨ VIDEO OUTPUT menu is entered to execute the various adjustments.

⑩ The MULTI LOOP TEST is terminated by pressing the STOP or EJECT button.
It is also terminated when the STOP or EJECT command is given from REMOTE.

⑪ After completing the adjustment, the input signal to the ANALOG VIDEO INPUT connector should be reconnected to an ordinary signal.

3-6. CHECKER MENU

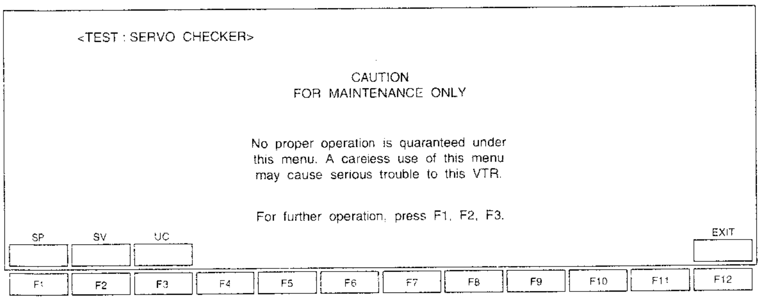
This menu is composed of three sections (SP, SV and UC). Test mode can be executed by inputting the desired command in each section.
(Refer to Section 3-6-7. Checker Menu Chart.)

This menu is used when adjusting servo system or tape transport system.

NOTE 1 : Be careful not to use the test mode not described in this manual. If the test mode is used, the corresponding operation cannot be guaranteed. To return to the normal state, turn the power on again.

NOTE 2 : Pay careful attention to the adjustments in this menu referring to Section 9, Tape Transport System Alignment and Section 10, Servo System Alignment. If several adjustments are incorrectly made in this menu, good-quality video and audio outputs may not be obtained or the tape or VTR mechanism system may be damaged.

The following operations are performed from control panel.
[TEST] : TEST menu is selected.
[F6] : CHECKER menu is selected.

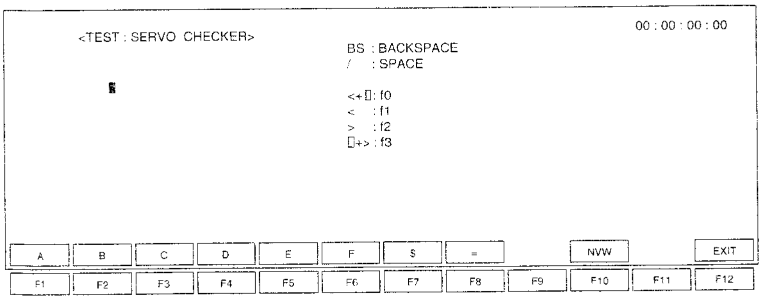

<TEST : SERVO CHECKER>

CAUTION
FOR MAINTENANCE ONLY

No proper operation is quaranteed under this menu. A careless use of this menu may cause serious trouble to this VTR.

For further operation, press F1, F2, F3.

When pressing [F1] (SP), [F2] (SV) or [F3] (UC) key, each CHECKER TEST menu is displayed on the EL panel and the cursor appears in the upper left position of the EL panel.


<TEST : SERVO CHECKER>
00 : 00 : 00 : 00

BS : BACKSPACE
/ : SPACE

<+▯: f0
< : f1
> : f2
▯+> : f3

Select an appropriate command from "List of Commands" in Section 3-6-2.
When pressing [F12] (EXIT) key, returns to the TEST menu.

3-6-1. Keys' Description

Function Keys

Function key	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F12
Display	A	B	C	D	E	F	S	=		NVW	EXIT

Cursor Key

In the servo system check, cursor keys are used as function keys.
The function is determined by the combination of three cursor keys, [>], [<] and [ ].
For explanations in this section, the cursor keys are referred to as f0~f3.

f0 = [ ]+ [<] , f3 = [ ]+ [>]
f1 = [<] , f2 = [>]

NOTE : For f0 and f3, press [ ] key and [<] key or [>] key at the same time.
However, when some of test commands are executed, each function is determined as the key is released.
Therefore release [<] key or [>] key before releasing [ ] key.

Other keys

[SET] : Used when you input a command or data.
[/] : Used as a space key. (Advance to the next address for $ and $$ commands.)
[BS] : Delete one character before the cursor. (Return to the previous address for $ and $$ commands.)
[GET] : Used when the data in the same address is read by $ and commands.

3-6-2. List of Commands

Session	Command	Function	Page
SP	$, $$	Rewrites memory data.	P. 3-25
	= 0	Resets the system.	P. 3-25
	NVW	Transfers the rewritten data to NOVRAM.	P. 3-26
	E	Enables the E test mode	P. 3-27 ~ 3-34
	F	Enables the F test mode	P. 3-35 ~ 3-61
SV	$, $$	Rewrites memory data.	P. 3-64
	= 0	Resets the system.	P. 3-65
	B	Enables the B test mode	P. 3-66 ~ 3-67
	C	Enables the C test mode	P. 3-68 ~ 3-85
	D	Enables the D test mode	P. 3-86 ~ 3-118
UC	$, $$	Rewrites memory data.	P. 3-121
	= 0	Resets the UC board.	P. 3-122
	C	Enables the C test mode	P. 3-123 ~ 3-127
	D	Enables the D test mode	P. 3-128 ~ 3-130

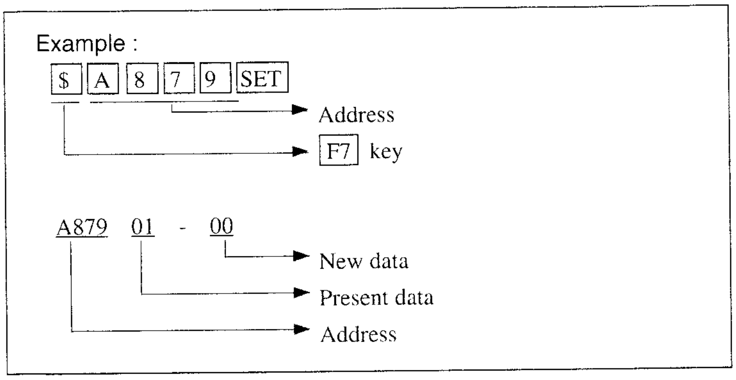
3-6-3. Example of Command Usage

(1) When rewriting memory data : SP Session $ ($$) Command, SV Session $ ($$) Command,
UC Session $ ($$) Command

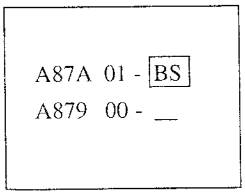
Press the keys on the control panel in the following sequence.

TEST : TEST menu is selected.
F6 (CHECKER) : CHECKER Menu is selected.
F1 (SP), F2 (SV) or F3 (UC) : CHECKER Menu is selected.
F12 (EXIT) : CHECKER Menu is terminated and control returns to the TEST menu.

Rewriting data by byte
Enter data as one byte.
Data in Address A879 is changed to "00H". As the present data is displayed on the control panel, enter new data.

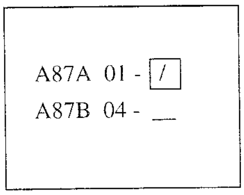


As soon as data input is completed, the cursor is moved to a position ready for the next byte of data.
How to Proceed to the Next Operation:
Return to the previous byte : Press the BS key.
Advance to the next byte : Press the / key.
When data entry is completed: Press the SET key. (the status is waiting for command input)



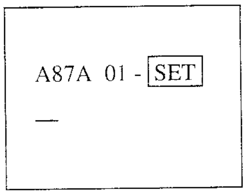
```
A87A 01 - BS
A879 00 - _
```

<Move to the previous byte>



```
A87A 01 - /
A87B 04 - _
```

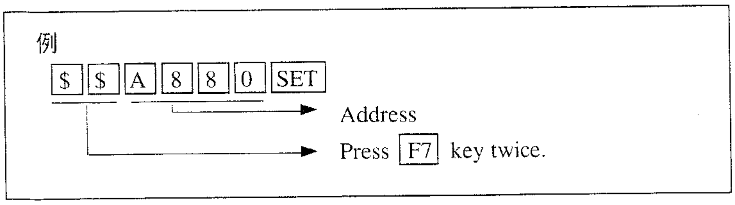
<Move to the next byte>



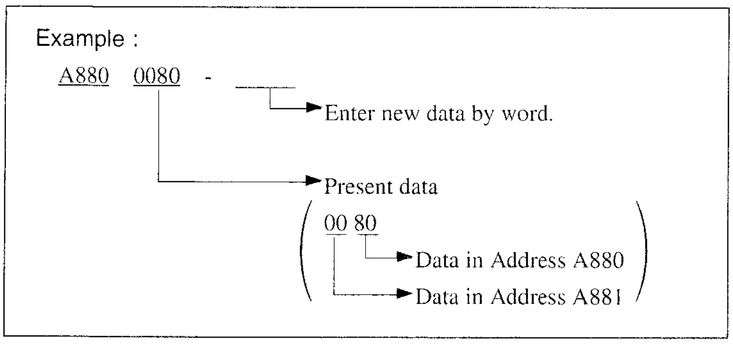
```
A87A 01 - SET
_
```

<Data entry is completed>

Rewriting data by word
To enter word data, select the mode from the command input state as follows:



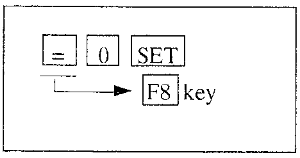
The control panel indication is :


Example :
A880 0080 -
Enter new data by word.
Present data
00 80
Data in Address A880
Data in Address A881

The key operation is performed in the same way as for byte input.

(2) System Reset : SP Session = 0 Command, SV Session = 0 Command

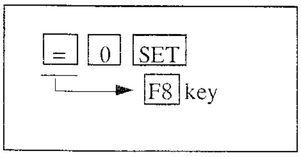
The system is reset to the same state as that when power is ON, or when the CPU RESET SW (S3) on SP-15 or SSP-07 board is pressed.
If this command is executed before the data is transferred to NOVRAM, the data changed by the $ or $$ command is lost.



The system is reset as follows.

(3) UC Reset : UC Session = 0 Command

The UC board is reset to the same state as when power is turned on.
The system is reset as follows.



(4) Transfer of Rewritten Data to NOVRAM : SP Session NVW Command

The changed data is lost by $, $$ command and so on, when the system is reset or the power is turned on again. Execute this command to save the changed data.
However, if you rewrite data, the original data is lost. Therefore, do not change the data thoughtlessly.

```
NVW SET
 └──────► F10 key
```

NOTE : When "BASE SUM ERROR" is displayed at the first attempt, it indicates NOVRAM failure.
Confirmation of all data or replacement of NOVRAM is required.

The address whose data is changed where the previous and next data are displayed. If the address and the data are correct, press / key.
If you want to stop writing, press SET key.
If the data in any unrequired address is changed, stop writing.

```
A879  01  -  00
                    ) / ···If the data is correct, press / key.  Press / key continuously until all the
                           related data are displayed.
A87A  01  -  02
                    ) /
A87B  04  -  02
                    ) /
A87C  43  -  15
                    ) SET ···Press SET key, if you want to stop.
 ┬
 └───────────────────────► Cursor waiting for a command
```

After all the changed data values have been displayed, "PUSH NVWR SW" is displayed on the control panel. Then, push NVRW SW (S71) on SP-15 or SSP-07 board.
Data transfer is started. When data transfer is completed, "READY" is displayed, and NVW command is terminated.
When there is no changed data, "READY" is displayed and NVW command is terminated.

3-6-4. SP TEST MODE MENU

Command List

Command	Function
$, $$	MEMORY READ / WRITE
= 0	SP, SY, SV, DT RESET
NVW	NOVRAM WRITE
E20	TEST MODE OFF (Cancels E mode)
E21	REEL SHIFT SENSOR READ
E22	CASSETTE COMPERTMENT SENSOR READ
E23	CASSETTE COMPERTMENT SENSOR READ
E24	CASSETTE COMPERTMENT SENSOR READ
E25	THREAD SENSOR READ
E2A	DRUM DATA READ
E2C	CORDING HOLE SENSOR READ
E2D	CORDING HOLE SENSOR READ
F20	TEST MODE OFF (Cancels F mode)
F21	REEL SHIFT TEST
F22	CASSETTE COMPARTMENT ALL TEST
F23	INNER CASSETTE COMPARTMENT TEST
F24	OUTER CASSETTE COMPARTMENT TEST
F25	THREAD TEST
F26	MAIN PINCH TEST
F27	SUB PINCH TEST
F28	HEAD CLEANER TEST
F29	TAPE CLEANER TEST
F2A	DRUM TEST
F30	TEST MODE OFF (Cancels F mode)
F31	REEL SHIFT TEST
F32	CASSETTE COMPARTMENT ALL DRIVER TEST
F33	INNER CASSETTE COMPARTMENT DRIVER TEST
F34	OUTER CASSETTE COMPARTMENT DRIVER TEST
F35	THREAD DRIVER TEST
F36	MAIN PINCH DRIVER TEST
F37	SUB PINCH DRIVER TEST
F38	HEAD CLEANER DRIVER TEST
F39	TAPE CLEANER DRIVER TEST
F3A	DRUM DRIVER TEST

SP $, $$ MEMORY READ / WRITE

Outline

This command can read or write the data of the memory specified by SP CPU in bytes or words.
Since the memory value is important to the determination of the VCR operation, confirm the contents of it completely before reading or writing the memory.
$ is used to read or write data in bytes, and $$ to read or write it in words.

Operation

Enter the address of $ or $$ memory. The memory address and the current data are displayed as shown below.

```
A800 20-
```

To rewrite data, enter a new data item you wish to enter.
The data is changed, and the address is advanced automatically. The display below then appears.

```
A800 20-21
A811 20-
```

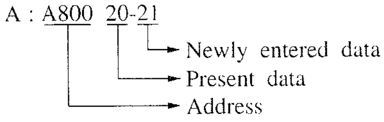
To rewrite data in succession, repeat the same key operation as the above.

Other key operations

To return to the preceding byte by one, press the BS key.
To proceed to the following byte by one, press the / key.
To terminate the operation, press the SET key.

Control Panel Display

```
$A800

A
```



SP = 0 SP, SY, SV, DT RESET

Outline

Entering this command can reset the SP, SV, SY and DT boards.

Operation

Enter the = 0 command using the function keys and numeric keypad on the control panel.

Control Panel Display

```
=0
```

SP NVW NOVRAM WRITE

Outline

This command can perform the NOVRAM WRITE operation that writes the data rewritten by memory write or adjustment in NOVRAM.

The adjustment value and set value that are important to the VCR operation are written in the NOVRAM.

The former data is lost when it is rewritten. Pay careful attention when rewriting data.

NOVRAM WRITE Operation

① Enter the SP NVW command. The address whose data was changed, the data before change, and the data after change are displayed.

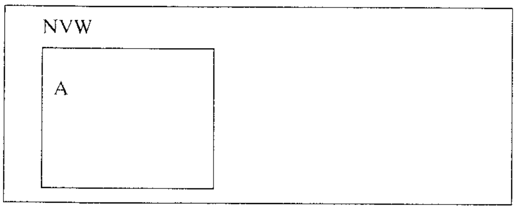
② Press the [/] key if no error exists in the address and data.
The changed data is displayed sequentially. To stop the write when an error exists, press the [SET] key.

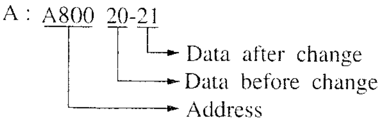
③ After all the changed data items are displayed (addresses A8FE through A8FF are a checksum), message "PUSH NVWR SW" is displayed on the control panel.
Press the S71 (NVW) switch on the SP-15 or SSP-07 board.

④ Data transfer is initiated.

⑤ After the data transfer is completed, message "READY" is displayed. The NVW command is completed.

Control Panel Display





The messages below are displayed.

"PUSH NVWR SW" : The display of all the changed data items is completed.
Press the S71 (NVWR) switch to transfer data.

"READY" : Data transfer is completed.

SP E21 : REEL SHIFT SENSOR READ

Outline

The reel shift sensor state can be displayed in this test mode.
The VTR operates ordinarily during test mode operation.
To erase the display of the reel shift sensor state, cancel the test mode by entering the E20 test mode or turning off the power.
This test mode is canceled when the next test mode is entered.

Control Panel Display

```
E21 RL SHT

RPOS --SL--MS
[        A        ]
[ B ][     C      ]
```

A : No display appears.

B : DVR-28 reel shift position data

```
--XX
  └─→ DVR-28 REEL SHIFT POSITION DATA
      (L-CASSETTE POSITION DATA > S-CASSETTE POSITION DATA)
```

Specifications

1. 6Fh ± 01h = A and value A - 30h = NOVRAM $A8AD when the reel shifts from L-cassette position to M-cassette position and when the take-up reel spring contracts.
2. Value A ± 03h = B and value B + 30 h = NOVRAM $A8AE when the reel shifts from S-cassette position to M-cassette position and when the supply reel spring contracts.
3. The value when the reel shifts to the S-cassette position and when the take-up reel spring contracts is NOVRAM $A8AC.
4. The value when the reel shifts to the L-cassette position and when the supply reel spring contracts is NOVRAM $A8AF.

C : Reel shift sensor state

DVR-20 series

```
------XXB
      │└─→ 1 : NO   0 : REEL SHIFT S-POSITION
      └──→ 1 : NO   0 : REEL SHIFT M-POSITION
```

DVR-28 series

```
--XX----B
  │└──────→ 1 : NO   0 : L-DIRECTION SPRING (S-REEL) SHORT
  └───────→ 1 : NO   0 : S-DIRECTION SPRING (T-REEL) SHORT
```

Specifications

DVR-20 series: The sensor data is 0 in the position of each end.
DVR-28 series: The sensor data must change from "1" to "0" in the position where each spring contracts by 1 mm.

SP E22 : CASSETTE COMPARTMENT SENSOR READ

Outline

The cassette compartment sensor state can be displayed in this test mode.
The VTR operates ordinarily during test mode operation.
To erase the display of the cassette compartment sensor state, cancel the test mode by entering the E20 test mode or turning off the power.
This test mode is canceled when the next test mode is entered.

Control panel display

```
E22 CAS ALL

CACT UDUMDIML
[      A      ]
[ B ][   C    ]
```

A : No display appears.

B : Cassette compartment control data

DVR-20
- - XX
→ CASSETTE COMPARTMENT CONTROL DATA

DVR-28
XXXX
→ INNER CASSETTE COMPARTMENT CONTROL DATA
→ OUTER CASSETTE COMPARTMENT CONTROL DATA

C : Sensor state of the cassette compartment
For the details of the specification etc. refer to Section 6. Part Replacement.

DVR-20
XX - - - XX - B
→ 1 : M-SIZE CASSETTE DETECT 0 : NO
→ 1 : NO 0 : CASSETTE IN
→ 1 : NO 0 : COMPARTMENT DOWN
→ 1 : NO 0 : COMPARTMENT UP

DVR-28
XXXXXXXXB
→ 1 : L-SIZE CASSETTE DETECT 0 : NO
→ 1 : L,M-SIZE CASSETTE DETECT 0 : NO
→ 1 : NO 0 : CASSETTE IN DETECT
→ 1 : NO 0 : OUTER COMPARTMENT DOWN
→ 1 : NO 0 : OUTER COMPARTMENT MID~DOWN
→ 1 : NO 0 : OUTER COMPARTMENT UP
→ 1 : NO 0 : INNER COMPARTMENT DOWN
→ 1 : NO 0 : INNER COMPARTMENT UP

SP E23 : CASSETTE COMPARTMENT SENSOR READ

Outline

The cassette compartment sensor state can be displayed in this test mode.
The VTR operates ordinarily during test mode operation.
To erase the display of the cassette compartment sensor state, cancel the test mode by entering the E20 test mode or turning off the power.
This test mode is canceled when the next test mode is entered.

Control Panel Display

```
E23 CAS IN

CACT UDUMDIML
[    A     ]
[B][  C    ]
```

A : No display appears.

B : Cassette compartment control data

DVR-20
- - XX
→ CASSETTE COMPARTMENT CONTROL DATA

DVR-28
XXXX
→ INNER CASSETTE COMPARTMENT CONTROL DATA
→ OUTER CASSETTE COMPARTMENT CONTROL DATA

C : Sensor state of the cassette compartment
For the details of the specification etc, refer to Section 6. Part Replacement.

DVR-20
XX - - - XX - B
→ 1 : M-SIZE CASSETTE DETECT 0 : NO
→ 1 : NO 0 : CASSETTE IN
→ 1 : NO 0 : COMPARTMENT DOWN
→ 1 : NO 0 : COMPARTMENT UP

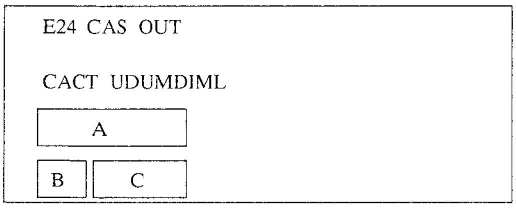
DVR-28
XXXXXXXXB
→ 1 : L-SIZE CASSETTE DETECT 0 : NO
→ 1 : L,M-SIZE CASSETTE DETECT 0 : NO
→ 1 : NO 0 : CASSETTE IN DETECT
→ 1 : NO 0 : OUTER COMPARTMENT DOWN
→ 1 : NO 0 : OUTER COMPARTMENT MID~DOWN
→ 1 : NO 0 : OUTER COMPARTMENT UP
→ 1 : NO 0 : INNER COMPARTMENT DOWN
→ 1 : NO 0 : INNER COMPARTMENT UP

SP E24 : CASSETTE COMPARTMENT SENSOR READ

Outline

The cassette compartment sensor state can be displayed in this test mode.
The VTR operates ordinarily during test mode operation.
To erase the display of the cassette compartment sensor state, cancel the test mode by entering the E20 test mode or turning off the power.
This test mode is canceled when the next test mode is entered.

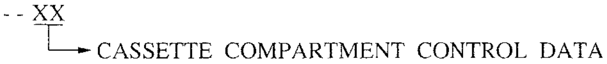
Control Panel Display


E24 CAS OUT
CACT UDUMDIML
A
B
C

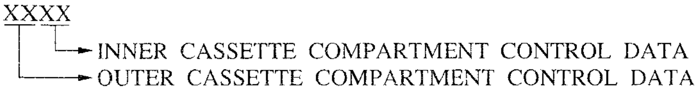
A : No display appears.

B : Cassette compartment control data

DVR-20

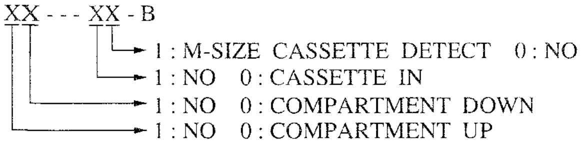

- - XX
CASSETTE COMPARTMENT CONTROL DATA

DVR-28

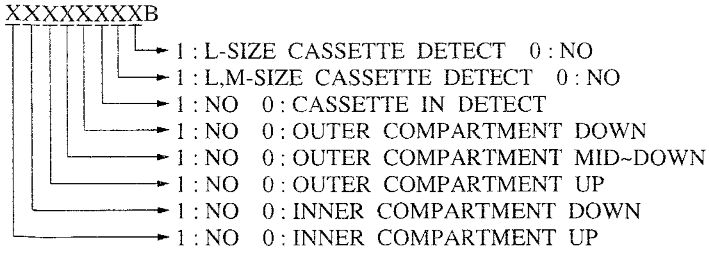

XXXX
INNER CASSETTE COMPARTMENT CONTROL DATA
OUTER CASSETTE COMPARTMENT CONTROL DATA

C : Sensor state of the cassette compartment
For the details of the specification etc, refer to Section 6. Part Replacement.

DVR-20


XX - - - XX - B
1 : M-SIZE CASSETTE DETECT 0 : NO
1 : NO 0 : CASSETTE IN
1 : NO 0 : COMPARTMENT DOWN
1 : NO 0 : COMPARTMENT UP

DVR-28

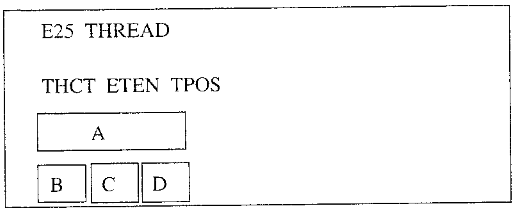

XXXXXXXXB
1 : L-SIZE CASSETTE DETECT 0 : NO
1 : L,M-SIZE CASSETTE DETECT 0 : NO
1 : NO 0 : CASSETTE IN DETECT
1 : NO 0 : OUTER COMPARTMENT DOWN
1 : NO 0 : OUTER COMPARTMENT MID~DOWN
1 : NO 0 : OUTER COMPARTMENT UP
1 : NO 0 : INNER COMPARTMENT DOWN
1 : NO 0 : INNER COMPARTMENT UP

SP E25 : THREAD SENSOR READ

Outline

The threading sensor state can be displayed in this test mode.
The VTR operates ordinarily during test mode operation.
To erase the display of the threading sensor state, cancel the test mode by entering the E20 test mode or turning off the power.
This test mode is canceled when the next test mode is entered.

Control Panel Display



A : No display appears.

B : Threading arm control data

- - XX
└→ THREADING ARM CONTROL DATA

C : Tension control reference data during threading

- - XX
└→ TENSION REFERENCE DATA (1g=16 / 25h)

D : Threading arm position data

- - XX
└→ THREADING POSITION DATA

Specifications

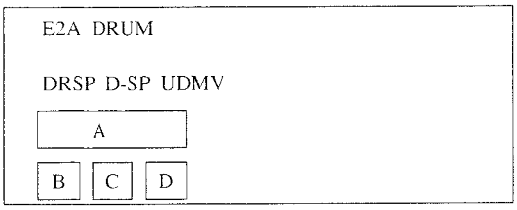
EDh in the threading standard position is written into the DATA = $A8A1 in the unthreading standard position.

SP E2A DRUM DATA READ

Outline

The drum state can be displayed in this test mode.
The VTR operates ordinarily during test mode operation.
To erase the display of the coding hole sensor state, cancel the test mode by entering the E20 test mode or turning off the power.
This test mode is canceled when the next test mode is entered.

Control Panel Display



A : No display appears.

B : Drum speed is displayed.
NTSC : 30h = 48 normal speed
PAL : 40h = 64 normal speed

C : Drum speed is displayed.
2710h = 10000 normal speed

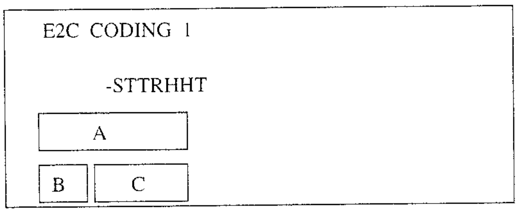
D : Control data of drum is displayed.

SP E2C : CODING HOLE SENSOR READ

Outline

The coding hole sensor state can be displayed in this test mode.
The VTR operates ordinarily during test mode operation.
To erase the display of the coding hole sensor state, cancel the test mode by entering the E20 test mode or turning off the power.
This test mode is canceled when the next test mode is entered.

Control Panel Display


E2C CODING 1
-STTRHHT
A
B
C

A : No display appears.

B : No display appears.

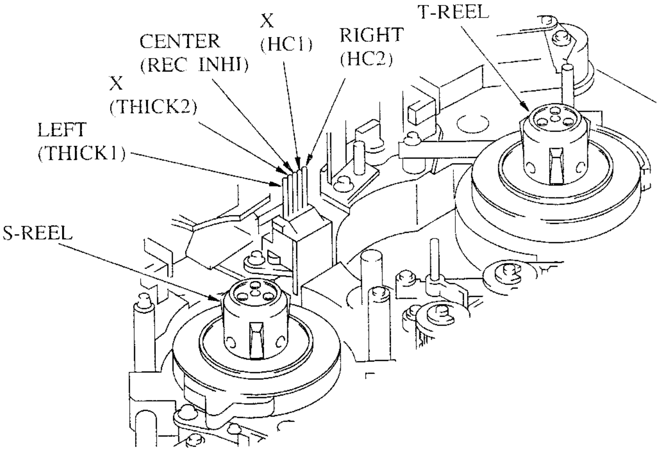
C: The detected data of cassete coding hole sensor is displayed.

-XXXXXXXB

1 : T-REEL SIDE USER FREE 0 : PUSH
1 : CODING HOLE THICK1 FREE 0 : PUSH
1 : CODING HOLE THICK2 FREE 0 : PUSH
1 : RECORD INHIBIT SW FREE 0 : PUSH
1 : CODING HOLE HC1 FREE 0 : PUSH
1 : CODING HOLE HC2 FREE 0 : PUSH
1 : S-REEL SIDE USER FREE 0 : PUSH

NOTE :

SWITCH POSITION VIEW

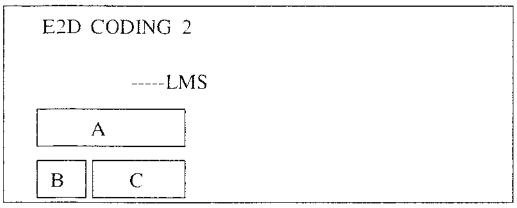

X
T-REEL
CENTER
(REC INHI)
(HC1)
RIGHT
(HC2)
X
(THICK2)
LEFT
(THICK1)
S-REEL

SP E2D : CODING HOLE SENSOR READ

Outline

The coding hole sensor state can be displayed in this test mode.
The VTR operates ordinarily during test mode operation.
To erase the display of the coding hole sensor state, cancel the test mode by entering the E20 test mode or turning off the power.
This test mode is canceled when the next test mode is entered.

Control Panel Display



A : No display appears.

B : No display appears.

C : The detected data of cassette coding hole sensor is displayed.

```
 - - - - - XXXB
           ││└──► 1 : S-CASSETTE CENTER USER FREE  0 : PUSH
           │└───► 1 : M-CASSETTE CENTER USER FREE  0 : PUSH
           └────► 1 : L-CASSETTE CENTER USER FREE  0 : PUSH (DVR-28 only)
```

SP F21 : REEL SHIFT TEST

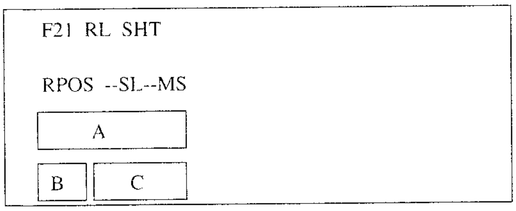
Outline

The reel shift test operation can be performed in this test mode.
The reel is shifted to the specified position by the function key operation.
The operation in this test mode uses sensor information, turns on or off a motor, and performs power control, as in the ordinary operation.
This test mode must be performed when the VTR is in the EJECT mode and when the cassette compartment is in the up position.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the F20 test mode or turning off the power.
This test mode is canceled when the next test mode is entered.

Key Operation

	(DVR-20)	(DVR-28)
[<]+☐	(f0) : Shifts to the M-cassette position.	Shifts to the L-cassette position.
[<]	(f1) : Shifts to the M-cassette position.	Shifts to the M-cassette position.
[>]	(f2) : Shifts to the M-cassette position.	Shifts to the M-cassette position.
[>]+☐	(f3) : Shifts to the S-cassette position.	Shifts to the S-cassette position.

Control Panel Display



F21 RL SHT

RPOS --SL--MS

A : The error messages below are displayed when a problem.
"NOT CAS UP": The cassette compartment is not in the up position.

"NOT EJECT" : The VTR is not in the EJECT mode.

For countermeasures, refer to Section 3-6-8. Countermeasures for Error Messages.

B : DVR-28 reel shift position data

-- XX

→ DVR-28 REEL SHIFT POSITION DATA
(L-CASSETTE POSITION DATA > S-CASSETTE POSITION DATA)

Specifications

1. 6Fh ± 01h = A and value A - 30h = NOVRAM $A8AD when the reel shifts from L-cassette position to M-cassette position and when the take-up reel spring contracts.
2. Value A ± 03h = B and value B + 30h = NOVRAM $A8AE when the reel shifts from S-cassette position to M-cassette position and when the supply reel spring contracts.
3. The value when the reel shifts to the S-cassette position and the take-up reel spring contracts is NOVRAM $A8AC.
4. The value when the reel shifts to the L-cassette position and the supply reel spring contracts is NOVRAM $A8AF.

C : Reel shift sensor state

DVR-20 series

```
------ XXB
       ||
       |└──► 1 : NO   0 : REEL  SHIFT  S-POSITION
       └───► 1 : NO   0 : REEL  SHIFT  M-POSITION
```

DVR-28 series

```
- - XX - - - - B
    ||
    |└────────► 1 : NO   0 : L-DIRECTION  SPRING  (S-REEL)  SHORT
    └─────────► 1 : NO   0 : S-DIRECTION  SPRING  (T-REEL)  SHORT
```

Specifications

DVR-20 series: The sensor data is 0 in the position of each end.

DVR-28 series: The sensor data must change from "1" to "0" in the position where each spring contracts by 1 mm.

SP F22 : CASSETTE COMPARTMENT ALL TEST

Outline

The cassette compartment test operation can be performed in this test mode.
The cassette compartment is shifted to the specified position by the function key operation.
The operation in this test mode uses sensor information, turns on or off a motor, and performs power control, as in ordinary operation
This test mode must be performed when the VTR is in the EJECT mode, when the threading arm is in the unthreading position, and when the cassette is not in the compartment position.
When using a cassette, enter the test mode after confirming that the cassette is inserted properly and that the reel table is in the proper position.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the F20 test mode or turning off the power.
This test mode is canceled when the next test mode is entered.

Key Operation

[<]+[ ] (f0) : Continuously performs the cassette compartment-down operation.
[<] (f1) : Can perform the cassette compartment-down operation only when this key is pressed.
[>] (f2) : Can perform the cassette compartment-up operation only when this key is pressed.
[>]+[ ] (f3) : Continuously performs the cassette compartment-up operation.

Control Panel Display

```
F22 CAS ALL

CACT UDUMDIML
[      A      ]
[B] [    C    ]
```

A : The error messages are displayed when a problem.
"C SIZE NG" : A cassette size detection error occurs.

"NOT EJECT" : The VTR is not in the EJECT mode.

"NOT R POS S", "NOT R POS M", "NOT R POS L" :
The reel position does not coincide with the cassette size.

"NOT UNTHR": The threading arm is not in the unthreading position.

For countermeasures, refer to Section 3-6-8. Countermeasures for Error Messages.

B : Cassette compartment control data

```
DVR-20
- - XX
     └──► CASSETTE COMPARTMENT CONTROL DATA


DVR-28
XXXX
 │ └──► INNER CASSETTE COMPARTMENT CONTROL DATA
 └────► OUTER CASSETTE COMPARTMENT CONTROL DATA
```

C : Sensor state of the cassette compartment
For the details of the specification etc, refer to Section 6. Part Replacement.

DVR-20
XX - - - XX - B
1 : M-SIZE CASSETTE DETECT 0 : NO
1 : NO 0 : CASSETTE IN
1 : NO 0 : COMPARTMENT DOWN
1 : NO 0 : COMPARTMENT UP

DVR-28
XXXXXXXXB
1 : L-SIZE CASSETTE DETECT 0 : NO
1 : L,M-SIZE CASSETTE DETECT 0 : NO
1 : NO 0 : CASSETTE IN DETECT
1 : NO 0 : OUTER COMPARTMENT DOWN
1 : NO 0 : OUTER COMPARTMENT MID-DOWN
1 : NO 0 : OUTER COMPARTMENT UP
1 : NO 0 : INNER COMPARTMENT DOWN
1 : NO 0 : INNER COMPARTMENT UP

SP F23 : INNER CASSETTE COMPARTMENT TEST

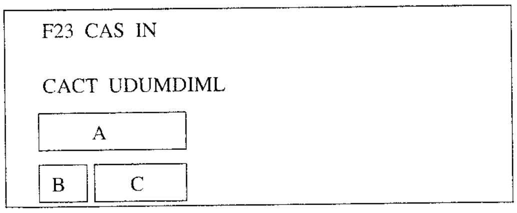
Outline

This test mode becomes the same in operation as the F22 test mode when it is selected in the DVR-20 series.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the F20 test mode or turning off the power.
This test mode is canceled when the next test mode is entered.
The inner cassette compartment test operation can be performed in the DVR-28 series.
The inner cassette compartment is shifted to the specified position by the function key operation.
The operation in this test mode uses sensor information, turns on or off a motor, and performs power control, as in the ordinary operation.
This test mode must be performed when the VTR is in the EJECT mode and when the outer cassette compartment is in the up position.

Key Operation

< + ☐	(f0) : Continuously performs the inner cassette compartment-down operation.
<	(f1) : Can perform the inner cassette compartment-down operation only when this key is pressed.
>	(f2) : Can perform the inner cassette compartment-up operation only when this key is pressed.
> + ☐	(f3) : Continuously perform the inner cassette compartment-up operation.

Control Panel Display



```
F23 CAS IN

CACT UDUMDIML
```

A : The error messages below are displayed when a problem.
"NOT EJECT" : The VTR is not in the EJECT mode.

"NOT OUT UP": The outer compartment is not in the up position.

For countermeasures, refer to Section 3-6-8. Countermeasures for Error Messages.

B : Cassette compartment control data

```
DVR-20
- - XX
     └─► CASSETTE COMPARTMENT CONTROL DATA


DVR-28
XXXX
 │ └─► INNER CASSETTE COMPARTMENT CONTROL DATA
 └───► OUTER CASSETTE COMPARTMENT CONTROL DATA
```

C : Sensor state of the cassette compartment
For the details of the specification etc, refer to Section 6. Part Replacement.

DVR-20
XX - - - XX - B
1 : M-SIZE CASSETTE DETECT 0 : NO
1 : NO 0 : CASSETTE IN
1 : NO 0 : COMPARTMENT DOWN
1 : NO 0 : COMPARTMENT UP

DVR-28
XXXXXXXXB
1 : L-SIZE CASSETTE DETECT 0 : NO
1 : L,M-SIZE CASSETTE DETECT 0 : NO
1 : NO 0 : CASSETTE IN DETECT
1 : NO 0 : OUTER COMPARTMENT DOWN
1 : NO 0 : OUTER COMPARTMENT MID-DOWN
1 : NO 0 : OUTER COMPARTMENT UP
1 : NO 0 : INNER COMPARTMENT DOWN
1 : NO 0 : INNER COMPARTMENT UP

SP F24 : OUTER CASSETTE COMPARTMENT TEST

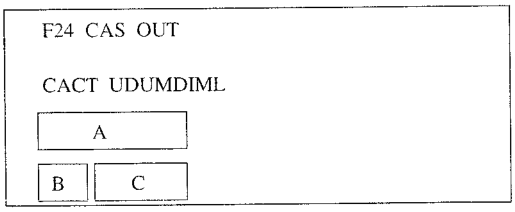
Outline

This test mode becomes the same in operation as the F22 test mode when it is selected in the DVR-20 series.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the F20 test mode or turning off the power.
This test mode is canceled when the next test mode is entered.
The outer cassette compartment test operation can be performed with the DVR-28 series.
The outer cassette compartment is shifted to the specified position by the function key operation.
The operation in this test mode uses sensor information, turns on or off a motor, and performs power control, as in the ordinary operation.
This test mode must be performed when the VTR is in the EJECT mode, when the threading arm is in the unthreading position, and when the cassette is not in the compartment position.
When using a cassette, enter the test mode after confirming that the cassette is inserted properly and that the reel table is in the proper position.

Key Operation

< + ☐	(f0) : Continuously performs the outer cassette compartment-down operation.
<	(f1) : Can perform the outer cassette compartment-down operation only when this key is pressed.
>	(f2) : Can perform the outer cassette compartment-up operation only when this key is pressed.
> + ☐	(f3) : Continuously performs the outer cassette compartment-up operation.

Control Panel Display



```
F24 CAS OUT

CACT UDUMDIML
```

A : The error messages below are displayed when a problem.

"C SIZE NG" : A cassette size detection error occurs.

"NOT EJECT" : The VTR is not in the EJECT mode.

"NOT IN DWN": The inner compartment is not in the down position.

"NOT R POS S", "NOT R POS M", "NOT R POS L" :
The reel position does not coincide with the cassette size.

"NOT UNTHR" : The threading arm is not in the unthreading position.

For countermeasures, refer to Section 3-6-8. Countermeasures for Error Messages.

B : Cassette compartment control data

DVR-20

- - XX
  - CASSETTE COMPARTMENT CONTROL DATA

DVR-28

XXXX
- INNER CASSETTE COMPARTMENT CONTROL DATA
- OUTER CASSETTE COMPARTMENT CONTROL DATA

C : Sensor state of the cassette compartment

For the details of the specification etc, refer to Section 6. Part Replacement.

DVR-20

XX - - - XX - B
- 1 : M-SIZE CASSETTE DETECT 0 : NO
- 1 : NO 0 : CASSETTE IN
- 1 : NO 0 : COMPARTMENT DOWN
- 1 : NO 0 : COMPARTMENT UP

DVR-28

XXXXXXXXB
- 1 : L-SIZE CASSETTE DETECT 0 : NO
- 1 : L,M-SIZE CASSETTE DETECT 0 : NO
- 1 : NO 0 : CASSETTE IN DETECT
- 1 : NO 0 : OUTER COMPARTMENT DOWN
- 1 : NO 0 : OUTER COMPARTMENT MID-DOWN
- 1 : NO 0 : OUTER COMPARTMENT UP
- 1 : NO 0 : INNER COMPARTMENT DOWN
- 1 : NO 0 : INNER COMPARTMENT UP

SP F25 : THREAD TEST

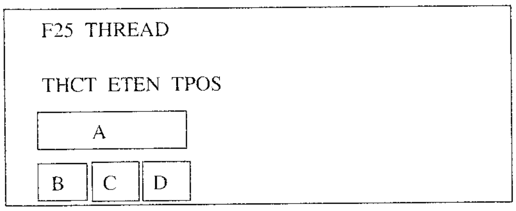
Outline

The threading test operation can be performed in this test mode.
The threading arm is shifted to the specified position by the function key operation.
The operation in this test mode uses sensor information, turns on or off a motor, and performs power control, as in the ordinary operation.
This test mode must be performed when the VTR is in the EJECT mode, when the cassette compartment is in the up position, and when the pinch roller is off.
The VTR does not operate ordinarily during test mode operation.
During operation completion, set the test mode to off by entering the F20 test mode or turning off the power.
This test mode is set to off when the next test mode is entered.

Key Operation

<+☐ (f0) : Shifts to the threading position.
< (f1) : Shifts to the threading position only when this key is pressed.
> (f2) : Shifts to the unthreading position only when this key is pressed.
>+☐ (f3) : Shifts to the unthreading position.

Control Panel Display



A : The error messages below are displayed when a problem.
"NOT CAS UP" : The cassette compartment is not in the up position.

"NOT EJECT" : The VTR is not in the EJECT mode.

"NOT PIN OFF": The pinch roller is not off.

For countermeasures, refer to Section 3-6-8. Countermeasures for Error Messages.

B : Threading arm control data

```
- - XX
    └→ THREADING ARM CONTROL DATA
```

C : Tension control reference data during threading

```
- - XX
    └→ TENSION REFERENCE DATA (1g=16 / 25h)
```

D : Threading arm position data

```
- - XX
    └→ THREADING POSITION DATA
```

Specifications

EDh in the threading standard position is written into the DATA = $A8A1 in the unthreading standard position.

SP F26 : MAIN PINCH TEST

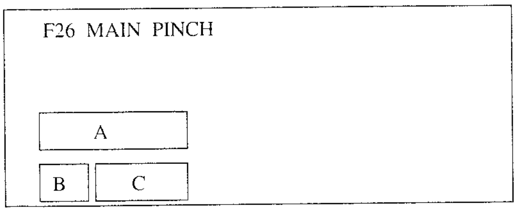
Outline

The main pinch test operation can be performed in this test mode.
The specified main pinch roller is turned on or off by the function key operation.
The operation in this test mode performs the same control as for the ordinary operation.
This test mode must be performed when the VTR is in the EJECT mode and when the threading arm is in the threading or unthreading position.
The VTR does not operate ordinarily during test mode operation.
During operation completion, set the test mode to off by entering the F20 test mode or turning off the power.
This test mode is set to off when the next test mode is entered.

Key Operation

☐<	(f1) : Turns off the main pinch roller only when this key is pressed.
☐>	(f2) : Turns on the main pinch roller.
☐> + ☐	(f3) : Turns on the main pinch roller.

Control Panel Display



A : The error messages below are displayed when a problem.
"NOT EJECT" : The VTR is not in the EJECT mode.

"THR POS NG" : The threading arm is not in the threading or unthreading position.

For countermeasures, refer to Section 3-6-8. Countermeasures for Error Messages.

B, C : Numbers are displayed, but they have no meaning.

SP F27 : SUB PINCH TEST

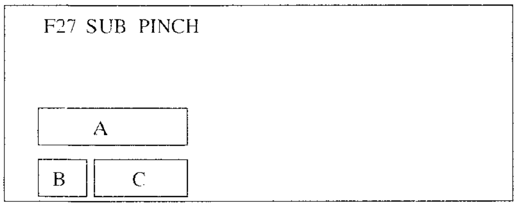
Outline

The sub pinch test operation can be performed in this test mode.
The specified sub pinch roller is turned on or off by the function key operation.
The operation in this test mode performs the same control as for the ordinary operation.
This test mode must be performed when the VTR is in the EJECT mode and when the threading arm is in the threading or unthreading position.
When the sub pinch roller is set to on state from off state, push it with your finger.
The VTR does not operate ordinarily during test mode operation.
During operation completion, set the test mode to off by entering the F20 test mode or turning off the power.
This test mode is canceled when the next test mode is entered.

Key Operation

< (f1) : Turns off the sub pinch roller.
> (f2) : Turns on the sub pinch roller only when this key is pressed.
> + ☐ (f3) : Turns on the sub pinch roller.

Control Panel Display



A : The error messages below are displayed when a problem.
"NOT EJECT" : The VTR is not in the EJECT mode.

"THR POS NG" : The threading arm is not in the threading or unthreading position.

For countermeasures, refer to Section 3-6-8. Countermeasures for Error Messages.

B, C : Numbers are displayed, but they have no meaning.

SP F28 : HEAD CLEANER TEST

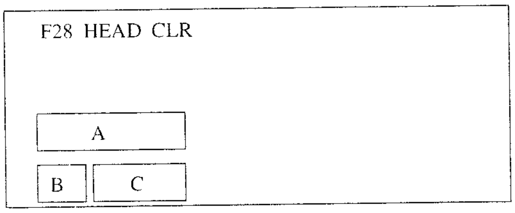
Outline

The head cleaner test operation can be performed in this test mode.
The head cleaner is turned on or off by the function key operation.
The operation in this test mode performs the same control as for the ordinary operation.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the F20 test mode or turning off the power.
This test mode is set to off when the next test mode is entered.

Key Operation

< + □	(f0) : Turns on or off the head cleaner.
<	(f1) : Turns on or off the head cleaner only when this key is pressed.
>	(f2) : Turns off the head cleaner.

Control Panel Display



A, B, C : Numbers are displayed, but they are no meaning.

SP F29 : TAPE CLEANER TEST

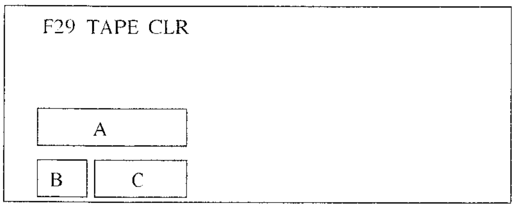
Outline

The tape cleaner test operation can be performed in this test mode.
The tape cleaner is turned on or off by the function key operation.
The operation in this test mode performs the same control as for the ordinary operation.
This test mode must be performed when the VTR is in the EJECT mode.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the F20 test mode or turning off the power.
This test mode is canceled when the next test mode is entered.

Key Operation

< + ☐ (f0) : Turns on the tape cleaner.
< (f1) : Turns on the tape cleaner only when this key is pressed.
> (f2) : Turns off the tape cleaner.

Control Panel Display



A : The error message below is displayed when a problem.
"NOT EJECT" : The VTR is not in the EJECT mode.

For countermeasures, refer to Section 3-6-8. Countermeasures for Error Messages.

B, C : Numbers are displayed, but they have no meaning.

SP F2A : DRUM TEST

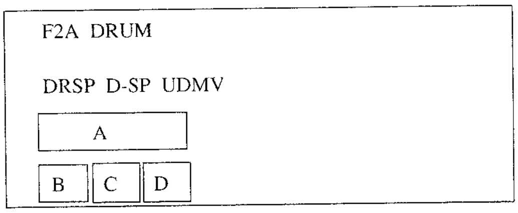
Outline

The drum rotation test operation can be performed in this test mode.
The drum is rotated by the function key operation.
This test mode must be performed when the VTR is in the EJECT mode.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the F20 test mode or turning off the power.
This test mode is canceled when the next test mode is entered.

Key Operation

< (f1) : Stops the drum rotation.
> (f2) : Rotates the drum at low speed.
> + □ (f3) : Rotates the drum at high speed.

Control Panel Display



A : The error message below is displayed when a problem.
"NOT EJECT" : The VTR is not in the EJECT mode.

For countermeasures, refer to Section 3-6-8. Countermeasures for Error Messages.

B : Drum speed is displayed.
NTSC : 30h = 48 normal speed
PAL : 40h = 64 normal speed

C : No display appears.

D : Control data of drum is displayed.

SP F31 : REEL SHIFT DRIVER TEST

Outline

The reel shift driver test operation can be performed in this test mode.
The reel is shifted in the specified direction by the function key operation, and the reel stopper pin moves up and down in the DVR-28 series.
Unlike the ordinary operation, the operation in this test mode uses no sensor information.
Therefore, the motor is not stopped automatically, and the variable power is not controlled.
Be careful not to damage the mechanical system and tape during test mode operation.
The VTR does not operate ordinarily during test mode operation.
During operation completion, set the test mode to off by entering the F30 test mode or turning off the power.
This test mode is set to off when the next test mode is entered.

Key Operation

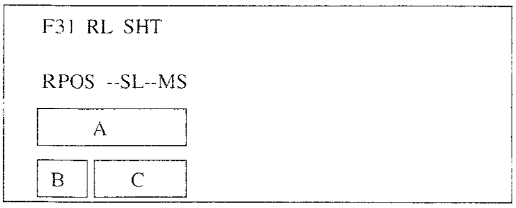
(DVR-20)

[<] + ☐	(f0) : Shifts in the M-cassette direction only when this key is pressed.
[<]	(f1) : Shifts in the M-cassette direction only when this key is pressed.
[>]	(f2) : Shifts in the M-cassette direction only when this key is pressed.
[>] + ☐	(f3) : Shifts in the S-cassette direction only when this key is pressed.

(DVR-28)

[<] + ☐	(f0) : Shifts in the L-cassette direction and in the reel stopper pin down direction only when this key is pressed.
[<]	(f1) : Shifts in the L-cassette direction and not shift in the reel stopper pin down direction only when this key is pressed.
[>]	(f2) : Shifts in the S-cassette direction and not shift in the reel stopper pin down derection only when this key is pressed.
[>] + ☐	(f3) : Shifts in the S-cassette direction and in the reel stopper pin down direction only when this key is pressed.

Control Panel Display



A : No display appears.

B : DVR-28 reel shift position data

-- XX
DVR-28 REEL SHIFT POSITION DATA
(L-CASSETTE POSITION DATA > S-CASSETTE POSITION DATA)

Specifications

1. 6Fh ± 01h = A and value A - 30h = NOVRAM $A8AD when the reel shifts from L-cassette position to M-cassette position and when the take-up reel spring contracts.
2. Value A ± 03h = B and value B + 30h = NOVRAM $A8AE when the reel shifts from S-cassette position to M-cassette position and when the supply reel spring contracts.
3. The value when the reel shifts to the S-cassette position and when the take-up reel spring contracts is NOVRAM $A8AC.
4. The value when the reel shifts to the L-cassette position and when the supply reel spring contracts is NOVRAM $A8AF.

C : Reel shift sensor state

DVR-20

```
------XXB
      ││
      │└─► 1 : NO   0 : REEL  SHIFT  S-POSITION
      └──► 1 : NO   0 : REEL  SHIFT  M-POSITION
```

DVR-28

```
--XX----B
  ││
  │└────────► 1 : NO   0 : L-DIRECTION  SPRING  (S-REEL)  SHORT
  └─────────► 1 : NO   0 : S-DIRECTION  SPRING  (T-REEL)  SHORT
```

Specifications

DVR-20 series: The sensor data is 0 in the position of each end.

DVR-28 series: The sensor data must change from "1" to "0" in the position where each spring contracts by 1 mm.

SP F32 : CASSETTE COMPARTMENT ALL DRIVER TEST

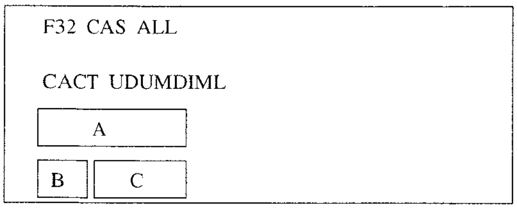
Outline

The cassette compartment driver test can be performed with the DVR-20 series.
The inner cassette compartment driver test can be performed with the DVR-28 series.
The (inner) cassette compartment is shifted to the specified position by the function key operation.
Unlike the ordinary operation, the operation in this test mode uses no sensor information.
Therefore, the motor is not stopped automatically, and the variable power is not controlled.
Be careful not to damage the mechanical system and tape during test mode operation.
Take care that the cassette and cassette compartment do not collide with the reel table and threading arm.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the F30 test mode or turning off the power.
This test mode is canceled when the next test mode is entered.

Key Operation

<	(f1) : Shifts in the (inner) cassette compartment-down direction only when this key is pressed.
>	(f2) : Shifts in the (inner) cassette compartment-up direction only when this key is pressed.

Control Panel Display



```
F32 CAS ALL

CACT UDUMDIML
```

A : No display appears.

B : Cassette compartment control data

DVR-20

```
- - XX
     └──► CASSETTE COMPARTMENT CONTROL DATA
```

DVR-28

```
XXXX
│ └──► INNER CASSETTE COMPARTMENT CONTROL DATA
└────► OUTER CASSETTE COMPARTMENT CONTROL DATA
```

C : Sensor state of the cassette compartment

For the details of the specification etc, refer to Section 6. Part Replacement.

DVR-20

XX - - - XX - B

1 : M-SIZE CASSETTE DETECT 0 : NO

1 : NO 0 : CASSETTE IN

1 : NO 0 : COMPARTMENT DOWN

1 : NO 0 : COMPARTMENT UP

DVR-28

XXXXXXXXB

1 : L-SIZE CASSETTE DETECT 0 : NO

1 : L,M-SIZE CASSETTE DETECT 0 : NO

1 : NO 0 : CASSETTE IN DETECT

1 : NO 0 : OUTER COMPARTMENT DOWN

1 : NO 0 : OUTER COMPARTMENT MID-DOWN

1 : NO 0 : OUTER COMPARTMENT UP

1 : NO 0 : INNER COMPARTMENT DOWN

1 : NO 0 : INNER COMPARTMENT UP

SP F33 : INNER CASSETTE COMPARTMENT DRIVER TEST

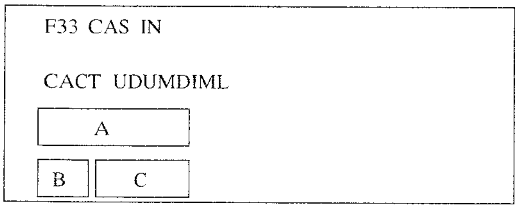
Outline

The cassette compartment driver test can be performed with the DVR-20 series.
The inner cassette compartment driver test can be performed with the DVR-28 series.
The (inner) cassette compartment is shifted to the specified position by the function key operation.
Unlike the ordinary operation, the operation in this test mode uses no sensor information.
Therefore, the motor is not stopped automatically, and the variable power is not controlled.
Be careful not to damage the mechanical system and tape during test mode operation.
Take care that the cassette and cassette compartment do not collide with the reel table and threading arm.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the F30 test mode or turning off the power.
This test mode is canceled when the next test mode is entered.

Key Operation

[<] (f1) : Shifts in the inner cassette compartment-down direction only when this key is pressed.
[>] (f2) : Shifts in the inner cassette compartment-up direction only when this key is pressed.

Control Panel Display


F33 CAS IN

CACT UDUMDIML

A : No display appears.

B : Cassette compartment control data

DVR-20
-- XX
→ CASSETTE COMPARTMENT CONTROL DATA

DVR-28
XXXX
→ INNER CASSETTE COMPARTMENT CONTROL DATA
→ OUTER CASSETTE COMPARTMENT CONTROL DATA

C : Sensor state of the cassette compartment
For the details of the specification etc, refer to Section 6. Part Replacement.

DVR-20
XX - - - XX - B
→ 1 : M-SIZE CASSETTE DETECT 0 : NO
→ 1 : NO 0 : CASSETTE IN
→ 1 : NO 0 : COMPARTMENT DOWN
→ 1 : NO 0 : COMPARTMENT UP

DVR-28
XXXXXXXXB
→ 1 : L-SIZE CASSETTE DETECT 0 : NO
→ 1 : L,M-SIZE CASSETTE DETECT 0 : NO
→ 1 : NO 0 : CASSETTE IN DETECT
→ 1 : NO 0 : OUTER COMPARTMENT DOWN
→ 1 : NO 0 : OUTER COMPARTMENT MID-DOWN
→ 1 : NO 0 : OUTER COMPARTMENT UP
→ 1 : NO 0 : INNER COMPARTMENT DOWN
→ 1 : NO 0 : INNER COMPARTMENT UP

SP F34 : OUTER CASSETTE COMPARTMENT DRIVER TEST

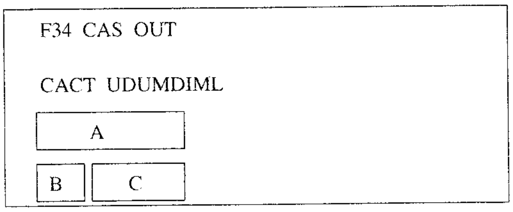
Outline

The cassett compartment driver test operation can be performed with the DVR-20 series.
The outer cassette compartment driver test operation can be performed with the DVR-28 series.
The outer cassette compartment is shifted in the specified direction by the function key operation.
Unlike the ordinary operation, the operation in this test mode uses no sensor information.
Therefore, the motor is not stopped automatically, and the variable power is not controlled.
Be careful not to damage the mechanical system and tape during test mode operation.
Take care that the cassette and cassette compartment do not collide with the reel table and threading arm.
This test mode becomes the same in operation as the F32 test mode when it is selected in DVR-20.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the F30 test mode or turning off the power.
This test mode is canceled when the next test mode is entered.

Key Operation

< (f1) : Shifts in the outer cassette compartment-down direction only when this key is pressed.
> (f2) : Shifts in the outer cassette compartment-up direction only when this key is pressed.

Control Panel Display



A : No display appears.

B : Cassette compartment control data

DVR-20
- - XX
→ CASSETTE COMPARTMENT CONTROL DATA

DVR-28
XXXX
→ INNER CASSETTE COMPARTMENT CONTROL DATA
→ OUTER CASSETTE COMPARTMENT CONTROL DATA

C : Sensor state of the cassette compartment
For the details of the specification etc, refer to Section 6. Part Replacement.

DVR-20
XX - - - XX - B
→ 1 : M-SIZE CASSETTE DETECT 0 : NO
→ 1 : NO 0 : CASSETTE IN
→ 1 : NO 0 : COMPARTMENT DOWN
→ 1 : NO 0 : COMPARTMENT UP

DVR-28
XXXXXXXXB
→ 1 : L-SIZE CASSETTE DETECT 0 : NO
→ 1 : L,M-SIZE CASSETTE DETECT 0 : NO
→ 1 : NO 0 : CASSETTE IN DETECT
→ 1 : NO 0 : OUTER COMPARTMENT DOWN
→ 1 : NO 0 : OUTER COMPARTMENT MID-DOWN
→ 1 : NO 0 : OUTER COMPARTMENT UP
→ 1 : NO 0 : INNER COMPARTMENT DOWN
→ 1 : NO 0 : INNER COMPARTMENT UP

SP F35 : THREAD DRIVER TEST

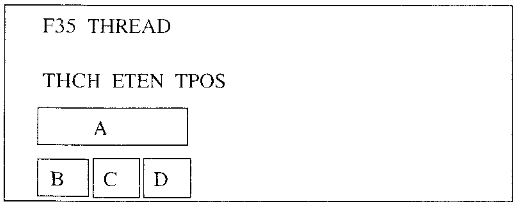
Outline

The threading driver test operation can be performed in this test mode.
The threading arm is shifted in the specified direction by the function key operation.
Unlike the ordinary operation, the operation in this test mode uses no sensor information.
Therefore, the motor is not stopped automatically, and the variable power is not controlled.
Be careful not to damage the mechanical system and tape during test mode operation.
Take care that the tape is not loaded, the pinch roller is not turned off, and the tape does not collide with the cassette and cassette compartment.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the F30 test mode or turning off the power.
This test mode is canceled when the next test mode is entered.

Key Operation

< + ☐ (f0) : Shifts in the threading direction.
< (f1) : Shifts in the threading direction only when this key is pressed.
> (f2) : Shifts in the unthreading direction only when this key is pressed.
> + ☐ (f3) : Shifts in the unthreading direction.

Control Panel Display



A : No display appears.

B : Threading arm control data
- - XX → THREADING ARM CONTROL DATA

C : Tension control data during threading
- - XX → TENSION CONTROL DATA

D : Threading arm position data
- - XX → THREADING POSITION DATA

Specifications

EDh in the threading standard position is written into DATA = $A8A1 in the unthreading standard position.

SP F36 : MAIN PINCH DRIVER TEST

Outline

The main pinch driver test operation can be performed in this test mode.
The specified main pinch roller is turned on or off by the function key operation.
Unlike the ordinary operation, the operation in this test mode uses no sensor information.
Be careful not to damage the mechanical system and tape during test mode operation.
Pay attention to the threading arm position.
This test mode must be performed when the threading arm is in the threading or unthreading position.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the F30 test mode or turning off the power.
This test mode is canceled when the next test mode is entered.

Key Operation

$\boxed{<}$ (f1) : Turns off the main pinch roller.
$\boxed{>}$ (f2) : Turns on the main pinch roller only when this key is pressed.
$\boxed{>} + \boxed{}$ (f3) : Turns on the main pinch roller.

Control Panel Display

```
F36 MAIN PINCH
```

SP F37 : SUB PINCH DRIVER TEST

Outline

The sub pinch driver test operation can be performed in this test mode.
The specified sub pinch roller is turned on or off by the function key operation.
Unlike the ordinary operation, the operation in this test mode uses no sensor information.
Therefore, the motor is not canceled automatically, and the variable power is not controlled.
Be careful not to damage the mechanical system and tape during test mode operation.
Pay attention to the threading arm position.
This test mode must be performed when the threading arm is in the threading or unthreading position.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the F30 test mode or turning off the power.
This test mode is canceled when the next test mode is entered.

Key Operation

[<] (f1) : Turns off the sub pinch roller.
[>] (f2) : Turns on the sub pinch roller only when this key is pressed.
[>]+[ ] (f3) : Turns on the sub pinch roller.

Control Panel Display

```
F37 SUB PINCH
```

SP F38 : HEAD CLEANER DRIVER TEST

Outline

The head cleaner driver test operation can be performed in this test mode.
The head cleaner is turned on or off by the function key operation.
Be careful not to damage the mechanical system and tape during test mode operation.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the F30 test mode or turning off the power.
This test mode is canceled when the next test mode is entered.

Key Operation

[<] + ☐	(f0) : Turns or off the head cleaner.
[<]	(f1) : Turns on the head cleaner only when this key is pressed.
[>]	(f2) : Turns off the head cleaner.

Control Panel Display

```
F38 HEAD CLR
```

SP F39 : TAPE CLEANER DRIVER TEST

Outline

The tape cleaner driver test operation can be performed in this test mode.
The tape cleaner is turned on or off by the function key operation.
Be careful not to damage the mechanical system and tape during test mode operation.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the F30 test mode or turning off the power.
This test mode is canceled when the next test mode is entered.

Key Operation

$\boxed{<}+\boxed{\phantom{<}}$ (f0) : Turns on the tape cleaner.
$\boxed{<}$ (f1) : Turns on the tape cleaner only when this key is pressed.
$\boxed{>}$ (f2) : Turns off the tape cleaner.

Control Panel Display

```
F39 TAPE CLR
```

SP F3A : DRUM DRIVER TEST

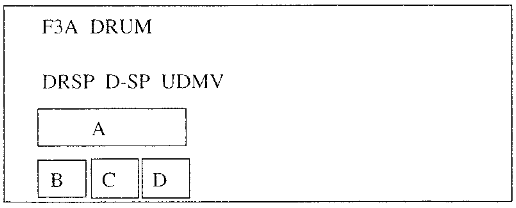
Outline

The drum driver test operation can be performed in this test mode.
The drum is rotated by the function key operation.
Be careful not to damage the mechanical system and tape during test mode operation.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the F30 test mode or turning off the power.
This test mode is canceled when the next test mode is entered.

Key operation

$\boxed{<}$ (f1) : Stops the drum rotation.
$\boxed{>}$ (f2) : Rotates the drum at low speed.
$\boxed{>} + \boxed{}$ (f3) : Rotates the drum at high speed.

Control Panel Display



A : No display appears.

B : Drum speed is displayed.
NTSC: 30h = 48 normal speed
PAL : 40h = 64 normal speed

C : No display appears

D : Control data of drum is displayed.

3-6-5. SV TEST MODE MENU

Command List

Command	Function
$, $$	MEMORY READ / WRITE
= 0	SP, SY, SV, DT RESET
B0	TEST MODE OFF (Cancels B mode)
B12	ACCEL SELECT
B15	DRUM PG ADJUST
B21	DT NORMAL/FIX SELECT
B22	CTL POSITION ALIGNMENT
C0	TEST MODE OFF (Cancels C mode)
C11	AUTO SERVO ADJUST
C12	CAPSTAN FG OFFSET ADJUST
C13	T-REEL FG OFFSET ADJUST
C14	S-REEL FG OFFSET ADJUST
C15	TAPE END SENSOR GAIN ADJUST
C16	TAPE TOP SENSOR GAIN ADJUST
C17	TAPE SAG SENSOR GAIN ADJUST
C18	T-REEL TORQUE ADJUST
C19	S-REEL TORQUE ADJUST
C1A	CAPSTAN NORMAL VELOCITY ADJUST
C1B	CAPSTAN FORMAT VELOCITY ADJUST
C1C	CAPSTAN FG GAIN ADJUST
C1D	DRUM PG POLARITY ADJUST
C1E	DRUM VELOCITY ADJUST
C28	S-TENSION OFFSET ADJUST
C29	S-TENSION GAIN ADJUST
C2A	T-TENSION OFFSET ADJUST
C2B	T-TENSION GAIN ADJUST
D0	TEST MODE OFF (Cancels D mode)
D11	AUTO SERVO CHECK
D12	CAPSTAN FG OFFSET CHECK
D13	T-REEL FG OFFSET CHECK
D14	S-REEL FG OFFSET ADJUST
D15	TAPE END SENSOR GAIN CHECK
D16	TAPE TOP SENSOR GAIN CHECK
D17	TAPE SAG SENSOR GAIN CHECK
D18	T-REEL TORQUE CHECK
D19	S-REEL TORQUE CHECK
D1A	CAPSTAN MOTOR CHECK

Command	Function
D1B	CAPSTAN NORMAL VELOCITY CHECK
D1C	CAPSTAN FORMAT VELOCITY CHECK
D1D	CAPSTAN FG GAIN CHECK
D1E	T-REEL BRAKE CHECK
D1F	S-REEL BRAKE CHECK
D21	T-REEL TENSION CHECK
D22	S-REEL TENSION CHECK
D23	DRUM LOCK CHECK
D24	DRUM PG/FG POLARITY CHECK
D25	DRUM VELOCITY CHECK
D26	DRUM PG JITTER CHECK
D27	THREAD CHECK
D28	CASSETTE COMPERTMENT CHECK
D29	REEL SHIFT CHECK
D2A	SENSOR CHECK
D2F	DRUM WAVEFORM CHECK

SV $, $$ MEMORY READ / WRITE

Outline

This command can read or write the data of the memory specified by SV CPU in bytes or words.
$ is used to read or write data in bytes, and $$ to read or write it in words.
This command is used in the factory.
If the NOVRAM data is changed, the VTR does not operate normally.

Note : This command cannot change NOVRAM data.
To change the NOVRAM data, enter the SP $, $$ command in an SP test mode menu.

SV = 0 SP, SY, SV, DT RESET

Outline

Entering this command can reset the SP, SV, SY and DT boards.

Operation

Enter the = 0 command using the function keys and numeric keypad on the control panel.

Control Panel Display

```
   =0
```

SV B12 ACCEL SELECT

Outline

This command selects tape acceleration / slowdown efficiency and can control the acceleration / slowdown function of shuttle and capstan.

Mode 0 ~ 2 correspond to ACCEL 1 ~ 3 of SET UP : INTERFACE menu.

Mode 3 can be set by test mode, not by SET UP : INTERFACE menu.

After adjustment, execute a B0 command and terminate this command.

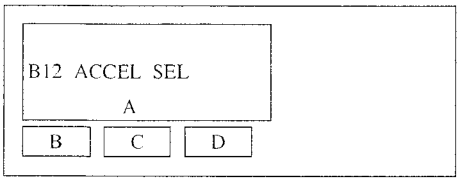
Return to the setting mode of SET UP : INTERFACE menu.

Key Operation

< (f1) ON : Mode number decreases one at a time.

> (f2) ON : Mode number increases one at a time.

Control Panel Display



A : No display appears.

B : No display appears.

C : XXXX : Display the mode number.
- 0 : (Corresponds to ACCEL : 1 of SET UP : INTERFACE menu)
  ordinary acceleration / slowdown
- 1 : (Corresponds to ACCEL : 2 of SET UP : INTERFACE menu)
  The slowdown efficiency is same as mode 0.
- 2 : (Corresponds to ACCEL : 3 of SET UP : INTERFACE menu)
  The slowdown efficiency is same as mode 0.
- 3 : Shuttle acceleration / slowdown efficiency is limited to quarter.
  Capstan acceleration efficiency is limited to half.
  Capstan slowdown efficiency is limited to quarter.
  This mode is used when rewinding long kept tape or the tape under unfavorable environment.

D : No display appears.

SV B15 DRUM PG ALIGNMENT

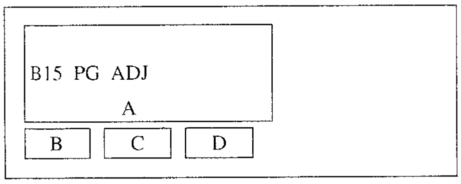
Outline

This command adjusts the PG phase of a drum.
The tracking phase is then set to the FIX position and the PG phase memory can be operated.
After adjustment is completed, NOVRAM WRITE is required from the SP checker.
The address to be changed is $$A8D1 of SP CPU.
The tracking is forcibly set to FIX irrespective of the VTR tracking menu while this command is executed. Therefore, after adjustment is completed, execute a B0 command and terminate this command.

Key Operation

[<]+☐ (f0) ON : The reference value (NTSC : 16B8H, PAL : 17A8H) is set when this key is pressed for more than one second.
[<] (f1) ON : The offset value decreases 4H at a time.
[>] (f2) ON : The offset value increases 4H at a time.
[>]+☐ (f3) ON : The reference value (NTSC : 16B8H, PAL : 17A8H) is set while this key is pressed.

Control Panel Display



A : The error message below is displayed when abnormality is detected. (of player)
"DT NOT FIX MODE : The DT Head is not the mount height fixed condition.
GO TO B21" The DT Head must be fixed in the position of the mount height when adjust the PG phase for a player. Execute a B21 command and set the DT Head to the fixed condition.

B :XXXX : Displays the DT head condition, normal or the mount height fixed.
0000 : normal condition
0001 : erasing distortion
0002 : mount height fixed condition

C : XXXX : Displays the adjustment value (NOVRAM $$A8D1) of a drum PG phase.
Memorized by executing NOVRAM WRITE from the SP checker after adjustment is completed.

D : No display appears.

Specification

(DVR-20/C20/20P/28/28P)
The reference point of a reference tape (TP102 on the REC-11 board) and the trailing edge of a reference signal on the EN-99 board (TP2 on the EN-99 board) must be within 0 ± 1 us.
(DVR-P20/P28)
The trailing edge of the A/C SEL signal (TP304 on the EQ-29 board) and the beggining of the audio track of the reference tape (TP104 on the EQ-29 board) must be within 25 ± 5 us.

SV B21 DT NORMAL/FIX SELECT (Used for player)

Outline

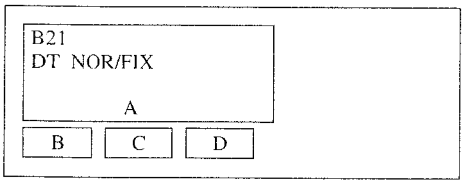
This command fixs the DT Head Height for a tracking adjustment, a CTL position adjustment and a drum PG phase adjustment by a player.
After an erasing distortion of the DT Head (about for 5 seconds), fix the DT Head in the position of the mount height.
In the normal operation, execute a B0 command and terminate this command.

Key Operation

[<] (f1) ON : Erasing the distortion starts, About after 5 seconds, the DT Head is fixed in the position of the mount height (fixed-condition mode).

[>] (f2) ON : DT is set to the normal mode. While the DT Head erases the distortion, after that, the DT Head is set to the normal mode automatically.

Control Panel Display



A : No display appears.

B : No display appears.

C :XXXX : Displays the DT head condition, normal or the mount height fixed.
0000 : normal condition
0001 : erasing distortion
0002 : mount height fixed condition

D : No display appears.

SV B22 CTL POSITION ALIGNMENT

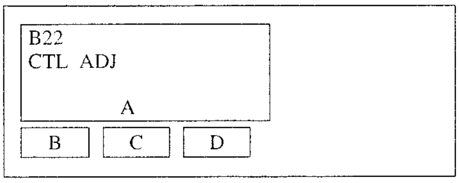
Outline

This command can change the tracking phase by the key operation on the control panel.
While this command is executed, the alignment value by test command is set automatically in spite of tracking menu of VTR.
After this adjustment, execute a B0 command and terminate this command.

Key Operation

< + ☐	(f0)	ON : The fixed value (80H) is set when this key is pressed for more than one second.
<	(f1)	ON : The tracking data decreases while this key is pressed.
>	(f2)	ON : The tracking data increases while this key is pressed.
> + ☐	(f3)	ON : The tracking data becomes the fixed value (80H) while this key is pressed.

Control Panel Display



A : The error message below is displayed when abnormality is detected. (for player)
"DT NOT FIX MODE : The DT Head is not the mount height fixed condition.
GO TO B21" The DT Head must be fixed in the position of the mount height when adjust the CTL position for a player.
Execute a B21 command and set the DT Head to the fixed condition.

B :XXXX : Displays the DT head condition, normal or the mount height fixed.
0000 : normal condition
0001 : erasing distortion
0002 : mount height fixed condition

C : - - XX : Displays the tracking data.
80H : tracking fixed value

D : No display appears.

Specification

CTL head position (player)

When the tracking position is set to the fixed condition and when the DT Head is fixed in the position of the mount height, the PB head output (Cch) must be maximum while the reference tape is played.

SV C11 AUTOMATIC SERVO ALIGNMENT

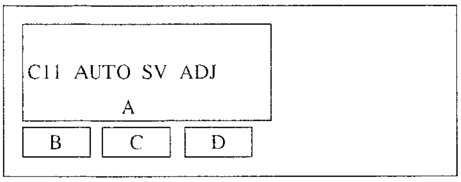
Outline

This command automatically adjusts the servo system.
It continuously performs the nine automatic adjustments of "C12" to "C1E".
After adjustment is completed, NOVRAM WRITE is required from the SP checker. For the address to be changed, refer to each item.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the C0 test mode or turning off the power.

Key Operation

$\boxed{>}$ (f2) ON : Starts the automatic adjustment.

Control Panel Display



A : The messages below are displayed.

"XXXXXXXXXXX SRT" : Displays the automatic adjustment command in execution.
"AUTO SV ADJ FIN" : Indicates that the automatic adjustment by C11 is completed.
"ERROR !!
XXXXXXXXXX" : Indicates that abnormality occurred. For more details, refer to each item.

B : Refer to each item.

C : Refer to each item.

D : Refer to each item.

SV C12 CAPSTAN FG OFFSET ALIGNMENT

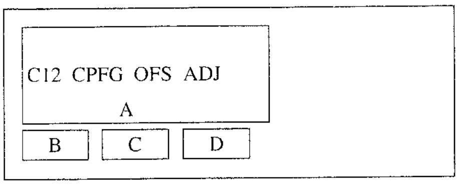
Outline

This command adjusts the capstan FG offset.
It adjusts the FG offset value so that the duty ratio of capstan FG A and FG B output pulses is 50 %.
The normal speed (C1A command), fast format speed (C1B command), and gain (C1 command) must be readjusted when the offset voltage is readjusted.
After adjustment is completed, NOVRAM WRITE is required from the SP checker.
The addresses to be changed are $$A880 and $$A882 of SP CPU.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the C0 test mode or turning off the power.

Key Operation

`>` (f2) ON : Starts the automatic adjustment.

Control Panel Display



A : The messages below are displayed.
"CPFG OFS AJ SRT" : Indicates that the automatic adjustment of a "C12" capstan FG offset is being executed.
"CPFG OFS AJ FIN" : Indicates that the automatic adjustment by "C12" is completed normally.

The error message below is displayed when abnormality is detected during adjustment.
The adjustment is then interrupted.
"ERROR !!
CAPSTAN FG" : No capstan FG pulse can be detected.

For countermeasures, refer to Section 3-6-8. Countermeasures for Error Messages.

B : 0202 : Indicates the state in which "C12" is selected.

C : XXXX : Indicates the adjustment value (NOVRAM $$A880) of a capstan FG A pulse.
Memorized by executing NOVRAM WRITE from the SP checker after adjustment is completed.

D: XXXX : Indicates the adjustment value (NOVRAM $$A882) of a capstan FG B pulse.
Memorized by executing NOVRAM WRITE from the SP checker after adjustment is completed.

SV C13 T-REEL FG OFFSET ALIGNMENT

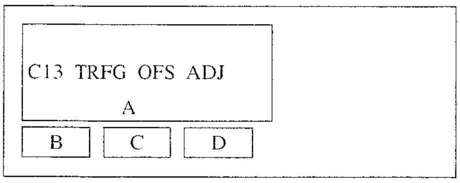
Outline

This command adjusts the take-up reel FG offset.
It adjusts the FG offset value so that the duty ratio of take-up reel FG A and FG B output pulses is 50 %.
After adjustment is completed, NOVRAM WRITE is required from the SP checker.
The addresses to be changed are $$A888 and $$A88A of SP CPU.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the C0 test mode or turning off the power.

Key Operation

[>] (f2) ON : Starts the automatic adjustment.

Control Panel Display



A : The messages below are displayed.

"TRFG OFS AJ SRT" : Indicates that the automatic adjustment of a "C13" take-up reel FG offset is being executed.
"TRFG OFS AJ FIN" : Indicates that the automatic adjustment by "C13" is completed normally.

The error message below is displayed when abnormality is detected during adjustment.
The adjustment is then interrupted.
"ERROR !!
T-REEL FG" : No take-up reel FG pulse can be detected.

For countermeasures, refer to Section 3-6-8. Countermeasures for Error Messages.

B : 0303 : Indicates the state in which "C13" is selected.

C : XXXX : Indicates the adjustment value (NOVRAM $$A888) of a take-up reel motor FG A pulse.
Memorized by executing NOVRAM WRITE from the SP checker after adjustment is completed.

D : XXXX : Indicates the adjustment value (NOVRAM $$A88A) of a take-up reel motor FG B pulse.
Memorized by executing NOVRAM WRITE form the SP checker after adjustment is completed.

SV C14 S-REEL FG OFFSET ALIGNMENT

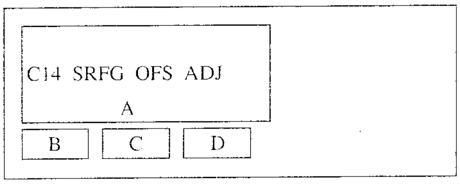
Outline

This command adjusts the supply reel FG offset.
It adjusts the FG offset value so that the duty ratio of supply reel FG A and FG B pulses is 50 %.
After adjustment is completed, NOVRAM WRITE is required from the SP checker.
The addresses to be changed are $$A884 and $$A886 of SP CPU.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the C0 test mode or turning off the power.

Key Operation

▷ (f2) ON : Starts the automatic adjustment.

Control Panel Display



A : The messages below are displayed.
"SRFG OFS AJ SRT" : Indicates that the automatic adjustment of a "C14" supply reel FG offset is being executed.
"SRFG OFS AJ FIN" : Indicates that the automatic adjustment by "C14" is completed normally.

The error message below is displayed when abnormality is detected during adjustment.
The adjustment is then interrupted.

"ERROR !!
S-REEL FG" : No supply reel FG pulse can be detected.

For countermeasures, refer to Section 3-6-8. Countermeasures, for Error Messages.

B : 0404 : Indicates the state in which "C14" is selected.

C : XXXX : Indicates the adjustment value (NOVRAM $$A884) of a supply reel motor FG A pulse.
Memorized by executing NOVRAM WRITE from the SP checker after adjustment is completed.

D: XXXX : Indicates the adjustment value (NOVRAM $$A886) of a supply reel motor FG B pulse.
Memorized by executing NOVRAM WRITE from the SP checker after adjustment is completed.

SV C15 TAPE END SENSOR GAIN ALIGNMENT

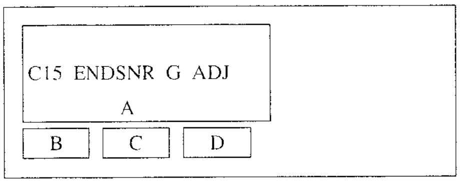
Outline

This command adjusts the gain of a tape end sensor.
It adjusts the value of an electronic volume control so that the output voltage of the tape end sensor is 2.4 V.
After adjustment is completed, NOVRAM WRITE is required from the SP checker.
The address to be changed is $A89E of SP CPU.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the C0 test mode or turning off the power.

Key Operation

`>` (f2) ON : Starts the automatic adjustment.

Control Panel Display



A : The messages below are displayed.
"ENDSNR G AJ SRT" : Indicates that the gain adjustment of a "C15" end sensor is being executed.
"ENDSNR G AJ FIN" : Indicates that the automatic adjustment by "C15" is completed normally.

The error message below is detected when abnormality is detected during adjustment.
The adjustment is then interrupted.
"ERROR !!
END SENSOR" : The output voltage of an end sensor cannot be adjusted to 2.4 ± 0.1 V.

For countermeasures, refer to Section 3-6-8. Countermeasures for Error Messages.

B : 0505	: Indicates the state in which "C15" is selected.
C : --XX	: Indicates the adjustment value (NOVRAM $A89E) of an end sensor gain. Memorized by executing NOVRAM WRITE from the SP checker after adjustment is completed.
D : --XX	: Indicates the output value of an end sensor. 0 to 5 V are represented as 00H to FFH. 2.4 V is 7AH.

SV C16 TAPE TOP SENSOR GAIN ALIGNMENT

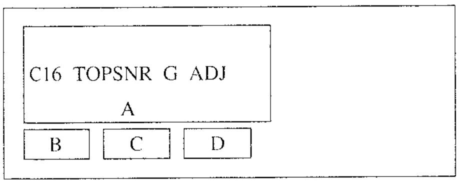
Outline

This command adjusts the gain of a tape top sensor.
It adjusts the value of an electronic volume control so that the output voltage of the tape top sensor is 2.4 V.
After adjustment is completed, NOVRAM WRITE is required from the SP checker.
The address to be changed is $A89C of SP CPU.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the C0 test mode or turning off the power.

Key Operation

[>] (f2) ON : Starts the automatic adjustment.

Control Panel Display



A : The messages below are displayed.

"TOPSNR G AJ SRT : Indicates that the gain adjustment of a "C16" top sensor is being executed.
"TOPSNR G AJ FIN" : Indicates that the automatic adjustment by "C16" is completed normally.

The error message below is displayed when abnormality is detected during adjustment.
The adjustment is then interrupted.
"ERROR !!
TOP SENSOR" : The output voltage of a top sensor cannot be adjusted to 2.4 ± 0.1 V.

For countermeasures, refer to Section 3-6-8. Countermeasures for Error Messages.

B : 0606 : Indicates the state in which "C16" is selected.

C : --XX : Indicates the adjustment value (NOVRAM $A89C) of a top sensor gain.
Memorized by executing NOVRAM WRITE from the SP checker after adjustment is completed.

D : --XX : Indicates the output value of a top sensor. 0 to 5 V are represented as 00H to FFH.
2.4 V is 7AH.

SV C17 TAPE CENTER (SAG) SENSOR GAIN ALIGNMENT

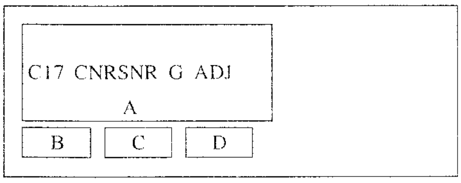
Outline

This command adjusts the gain of a tape center (sag) sensor.
It adjusts the value of an electronic volume control so that the output voltage of the tape center sensor is 2.4 V.
After adjustment is completed, NOVRAM WRITE is required from the SP checker.
The address to be changed is $A89D of SP CPU.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the C0 test mode or turning off the power.

Key Operation

[>] (f2) ON : Starts the automatic adjustment.

Control Panel Display



A : The messages below are displayed.
"CNRSNR G AJ SRT" : Indicates that the gain adjustment of a "C17" center sensor is being executed.
"CNRSNR G AJ FIN" : Indicates that the automatic adjustment by "C17" is completed normally.

The error message below is displayed when abnormality is detected during adjustment.
The adjustment is then interrupted.
"ERROR !!
CENTER SENSOR" : The output voltage of a center sensor cannot be adjusted to 2.4 ± 0.1 V.

For countermeasures, refer to Section 3-6-8. Countermeasures for Error Messages.

B : 0707 : Indicates the state in which "C17" is selected.

C : --XX : Indicates the adjustment value (NOVRAM $A89D) of a center sensor gain.
Memorized by executing NOVRAM WRITE from the SP checker after adjustment is completed.

D : --XX : Indicates the output value of a center sensor. 0 to 5 V are represented as 00H to FFH.
2.4 V is 7AH.

SV C18 T-REEL MOTOR TORQUE ALIGNMENT

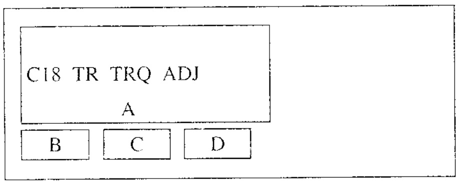
Outline

This command adjusts the output torque of a take-up reel motor.
It measures the torque constant of the take-up reel motor and calculates the correction value for a standard torque constant.
A take-up reel FG offset voltage must be adjusted during this adjustment (using a C13 command).
After adjustment is completed, NOVRAM WRITE is required from the SP checker.
The address to be changed is $A88F of SP CPU.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the C0 test mode or turning off the power.

Key Operation

▷ (f2) ON : Starts the automatic adjustment.

Control Panel Display



A : The messages below are displayed.
"TR TRQ ADJ SRT" : Indicates that the torque adjustment of a "C18" take-up reel is being executed.
"TR TRQ ADJ FIN" : Indicates that the automatic adjustment by "C18" is completed normally.

The error message below is displayed when abnormality is detected during adjustment.
"ERROR !!
T-REEL TORQUE" : No take-up reel torque can be adjusted.

For countermeasures, refer to Section 3-6-8. Countermeasures for Error Messages.

B : 0808 : Indicates the state in which "C18" is selected.

C : XXXX : Indicates the mean value of measured acceleration
(the number of reel FG waves that change for approximately 80 ms).

D : XX-- : Indicates the correction value (NOVRAM $A88F) of a take-up reel torque.
-25 % to +25 % are represented as 00H to FFH.
The reference value is 80H.
Memorized by executing NOVRAM WRITE from the SP checker after adjustment is completed.

SV C19 S-REEL MOTOR TORQUE ALIGNMENT

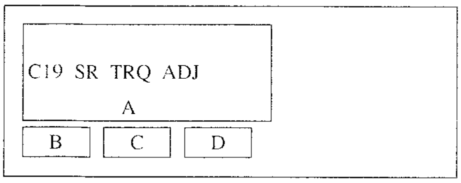
Outline

This command adjusts the output torque of a supply reel motor.
It measures the torque constant of the supply reel motor and calculates the correction value for a standard torque constant.
A supply reel FG offset voltage must be adjusted during this adjustment (using a C14 command).
After adjustment is completed, NOVRAM WRITE is required from the SP checker.
The address to be changed is $A88E of SP CPU.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the C0 test mode or turning off the power.

Key Operation

[>] (f2) ON : Starts the automatic adjustment.

Control Panel Display



A : The messages below are displayed.
"SR TRQ ADJ SRT" : Indicates that the torque adjustment of a "C19" supply reel is being executed.
"SR TRQ ADJ FIN" : Indicates that the automatic adjustment by "C19" is completed normally.

The error message below is displayed when abnormality is detected during adjustment.
The adjustment is then interrupted.
"ERROR !!
S-REEL TORQUE" : No supply reel torque can be adjusted.

For countermeasures, refer to Section 3-6-8. Countermeasures for Error Messages.

B : 0909 : Indicates the state in which "C19" is selected.

C : XXXX : Indicates the mean value of measured acceleration
(the number of reel FG waves that change for approximately 80 ms).

D : --XX : Indicates the correction value (NOVRAM $A88E) of a supply reel torque.
-25 % to +25 % are represented as 00H to FFH. The reference value is 80H.
Memorized by executing NOVRAM WRITE from the SP checker after adjustment is completed.

SV C1A CAPSTAN NORMAL VELOCITY ALIGNMENT

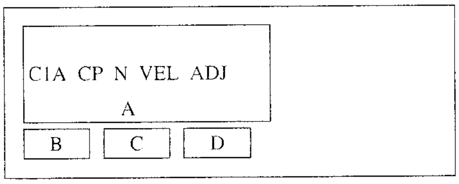
Outline

This command rotates the capstan motor at REC speed and adjusts the reference value so that the output from a speed error measuring instrument is minimum.
A capstan offset voltage must be adjusted during this adjustment (using a C12 command).
After adjustment is completed, NOVRAM WRITE is required from the SP checker.
The address to be changed is $$A8C2 of SP CPU.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the C0 test mode or turning off the power.

Key Operation

[>] (f2) ON: Starts the automatic adjustment.

Control Panel Display



A : The messages below are displayed.
"CP N VEL AJ SRT" : Indicates that the REC speed adjustment of a "C1A" capstan is being executed.
"CP N VEL AJ FIN" : Indicates that the automatic adjustment by "C1A" is completed normally.

The error messages below are displayed when abnormality is detected during adjustment.
The adjustment is then interrupted.
"ERROR !!
CAPSTAN MOTOR": A capstan motor cannot be rotated at REC speed.
"ERROR !!
CP NORM VELO" : The output from a speed error measuring instrument cannot be minimum after 20-second adjustment.
"ERROR !!
CP NVL UNSTBL" : The driving voltage of a capstan motor fluctuates excessively.

For countermeasures, refer to Section 3-6-8. Countermeasures for Error Messages.

B : 0A0A : Indicates the state in which "C1A" is selected.

C : XXXX : Indicates the capstan speed.
The REC speed corresponds to 0FA0H (= 40000).

D : XXXX : Indicates the reference value (NOVRAM $$A8C2) OF a speed error measuring instrument.
The reference value is 2DEEH.
Memorized by executing NOVRAM WRITE from the SP checker after adjustment is completed.

SV C28 S-TENSION OFFSET ALIGNMENT

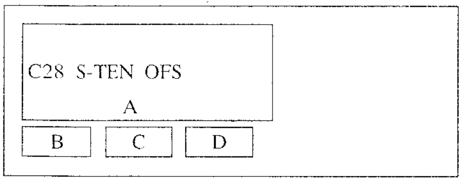
Outline

This command adjusts the offset voltage of a supply tension amplifier.
It can adjust the offset voltage while confirming the tension measurement value.
A supply tension adjustment tool is required to perform this adjustment.
After adjustment is completed, NOVRAM WRITE is required from the SP checker.
The address to be changed is $$A890 of SP CPU.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the C0 test mode or turning off the power.

Key Operation

< + ☐	(f0) ON : The reference value (8000H) is set when this key is pressed for more than one second.
<	(f1) ON : The offset value decreases 10H at a time.
>	(f2) ON : The offset value increases 10H at a time.
> + ☐	(f3) ON : The reference value (8000H) is set while this key is pressed.

Control Panel Display



A : No display appears.

B : XXXX : Displays the supply tension offset value (NOVRAM $$A890).
Memorized by executing NOVRAM WRITE from the SP checker after adjustment is completed.

C : --XX : Displays the supply tension data.
DVR-20 : Corresponds to 00H when an "S TEN" signal (at TP39) on the SV-133 board is 0 V.
Corresponds to FFH when it is 5 V.
DVR-28 : Corresponds to 00H when an "S TEN" signal (at TP39) on the SSP-07 board is 0 V.
Corresponds to FFH when it is 5 V.

D : No display appears.

Specification

For 55 g, the supply tension data must be 54 ± 1H.
For 0 g, the supply tension data must be 0F ± 1H.

SV C29 S-TENSION GAIN ALIGNMENT

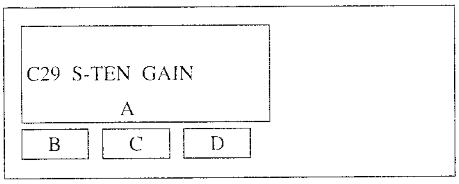
Outline

This command adjusts the gain of a supply tension amplifier.
It can adjust the amplifier gain while confirming the tension measurement value.
A supply tension adjustment tool is required to perform this adjustment.
After adjustment is completed, NOVRAM WRITE is required from the SP checker.
The address to be changed is $A892 of SP CPU.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the C0 test mode or turning off the power.

Key Operation

$\boxed{<}$+☐ (f0) ON : The reference value (80H) is set when this key is pressed for more than one second.
$\boxed{<}$ (f1) ON : The offset value decreases 1H at a time.
$\boxed{>}$ (f2) ON : The offset value increases 1H at a time.
$\boxed{>}$+☐ (f3) ON : The reference value (80H) is set while this key is pressed.

Control Panel Display



A : No display appears.

B : --XX : Displays the supply tension gain value (NOVRAM $A892).
Memorized by executing NOVRAM WRITE from the SP checker after adjustment is completed.

C : --XX : Displays the supply tension data.
DVR-20 : Corresponds to 00H when an "S TEN" signal (at TP39) on the SV-133 board is 0 V.
Corresponds to FFH when it is 5 V.
DVR-28 : Corresponds to 00HG when an "S TEN" signal (at TP39) on the SSP-07 board is 0V.
Corresponds to FFH when it is 5 V.

D : No display appears.

Specification

For 55 g, the supply tension data must be 54 ± 1H.
For 0 g, the supply tension data must be 0F ± 1H.

SV C2A T-TENSION OFFSET ALIGNMENT

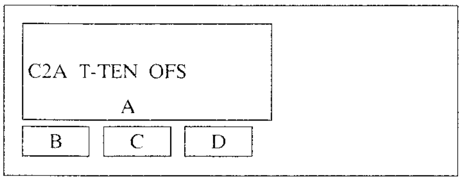
Outline

This command adjusts the offset voltage of a take-up tension amplifier.
It can adjust the offset voltage while confirming the tension measurement value.
A take-up tension adjustment tool is required to perform this adjustment.
After adjustment is completed, NOVRAM WRITE is required from the SP checker.
The address to be changed is $$A8B6 of SP CPU.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the C0 test mode or turning off the power.

Key Operation

<+☐ (f0) ON : The reference value (8000H) is set when this key is pressed for more than one second.
< (f1) ON : The offset value decreases 10H at a time.
\> (f2) ON : The offset value increases 10H at a time.
\>+☐ (f3) ON : The reference value (8000H) is set while this key is pressed.

Control Panel Display



A : No display appears.

B : XXXX : Displays the take-up tension offset value (NOVRAM $$A8B6).
Memorized by executing NOVRAM WRITE from the SP checker after adjustment is completed.

C : --XX : Displays the take-up tension data.
DVR-20 : Corresponds to 00H when a "T TEN" signal (at TP40) on the SV-133 board is 0 V.
Corresponds to FFH when it is 5 V.
DVR-28 : Corresponds to 00H when a "T TEN" signal (at TP40) on the SSP-07 board is 0 V.
Corresponds to FFH when it is 5 V.

D : No display appears.

Specification

For 42 g, the take-up tension data must be 90 ± 1H.
For 0 g, the take-up tension data must be 0F ± 3H.

SV C2B T-TENSION GAIN ALIGNMENT

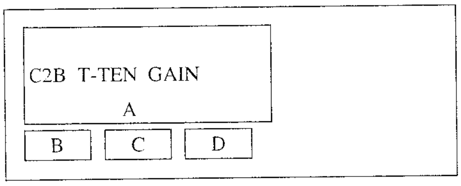
Outline

This command adjusts the gain of a take-up tension amplifier.
It can adjust the amplifier gain while confirming the tension measurement value.
A take-up tension adjustment tool is required to perform this adjustment.
After adjustment is completed, NOVRAM WRITE is required from the SP checker.
The address to be changed is $A8B8 of SP CPU.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the C0 test mode or turning off the power.

Key Operation

[<] + ☐ (f0) ON : The reference value (80H) is set when this key is pressed for more than one second.
[<] (f1) ON : The offset value decreases 1H at a time.
[>] (f2) ON : The offset value increases 1H at a time.
[>] + ☐ (f3) ON : The reference value (80H) is set while this key is pressed.

Control Panel Display



A : No display appears.

B : --XX : Displays the take-up tension gain value (NOVRAM $A8B8).
Memorized by executing NOVRAM WRITE from the SP checker after adjustment is completed.

C : --XX : Displays the take-up tension data.
DVR-20 : Corresponds to 00H when a "T TEN" signal (at TP40) on the SV-133 board is 0 V.
Corresponds to FFH when it is 5 V.
DVR-28 : Corresponds to 00H when a "T TEN" signal (at TP40) on the SSP-07 board is 0 V.
Corresponds to FFH when it is 5 V.

D : No display appears.

Specification

For 42 g, the take-up tension data must be 90 ± 1H.
For 0 g, the tape-up tension data must be 0F ± 3H.

SV D11 AUTOMATIC SERVO DIAGNOSTICS

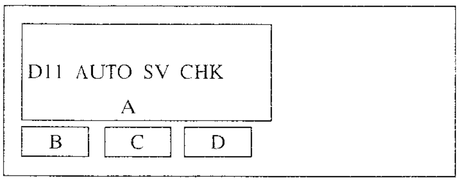
Outline

This command performs the self diagnosis of a servo system.
It continuously performs the twenty four self diagnoses of "D12" to "D2A".
If some abnormality exists in the servo system, the defective point can be restricted by executing this command.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the D0 test mode or turning off the power.

Key Operation

[>] (f2) ON : Starts the self diagnosis.

Control Panel Display



A : The messages below are displayed.

"XXXXXXXXXXX SRT" : Displays the self-diagnosis command in execution.

"AUTO SV CHK FIN" : Indicates that the self diagnosis by "D11" is completed.
"ERROR !!
XXXXXXXXXX" : Indicates that abnormality occurred.
For more details, refer to each item.

B : Refer to each item.

C : Refer to each item.

D : Refer to each item.

SV D12 CAPSTAN FG OFFSET DIAGNOSTICS

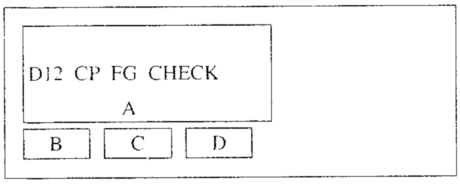
Outline

This command inspects the capstan FG.
It confirms the duty ratio of capstan FG A and FG B output pulses.
The addresses of NOVRAM data to be confirmed are $$A880 and $$A882.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the D0 test mode or turning off the power.

Key Operation

[>] (f2) ON : Starts the self diagnosis.

Control Panel Display



A : The messages below are displayed.
"CP FG CHCK SRT" : Indicates that the self diagnosis of a "D12" capstan FG is being executed.
"CP FG CHCK FIN" : Indicates that the self diagnosis by "D12" is completed normally.

The error message below is displayed when abnormality is detected.

"ERROR !!
CAPSTAN FG" : No capstan FG can be detected or the duty ratio is abnormal.

For countermeasures, refer to Section 3-6-8. Countermeasures for Error Messages.

B : 0202	: Indicates the state in which "D12" is selected.
C : XXXX	: Indicates the speed of a capstan FG A pulse. NTSC : Number of FG A waves that are detected for 16.6 ms PAL : Number of FG A waves that are detected for 20.0 ms
D : XXXX	: Indicates the speed of a capstan FG B pulse. NTSC : Number of FG B waves that are detected for 16.6 ms PAL : Number of FG B waves that are detected for 20.0 ms

SV D13 T-REEL FG OFFSET DIAGNOSTICS

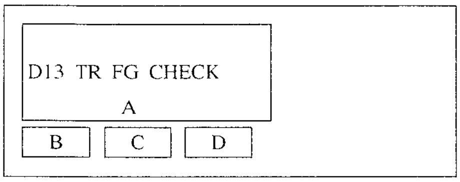
Outline

This command inspects the take-up reel FG.
It confirms the duty ratio of take-up reel FG A and FG B output pulses.
The addresses of NOVRAM data to be confirmed are $$A888 and $$A88A.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the D0 test mode or turning off the power.

Key Operation

[>] (f2) ON : Starts the self diagnosis.

Control Panel Display



A : The messages below are displayed.
"TR FG CHCK SRT" : Indicates that the self diagnosis of a "D13" take-up reel FG is being executed.
"TR FG CHCK FIN" : Indicate that the self diagnosis by "D13" is completed normally.

The error message below is displayed when abnormality is detected.
"ERROR !!
T-REEL FG" : No take-up reel FG can be detected or the duty ratio is abnormal.

For countermeasures, refer to Section 3-6-8. Countermeasures for Error Messages.

B : 0303 : Indicates the state in which "D13" is selected.

C : XXXX : Indicates the speed of a take-up reel FG A pulse.
NTSC : Number of FG A waves that are detected for 16.6 ms
PAL : Number of FG A waves that are detected for 20.0 ms

D : XXXX : Indicates the speed of a take-up reel FG B pulse.
NTSC : Number of FG B waves that are detected for 16.6 ms
PAL : Number of FG B waves that are detected for 20.0 ms

SV D14 S-REEL FG OFFSET DIAGNOSTICS

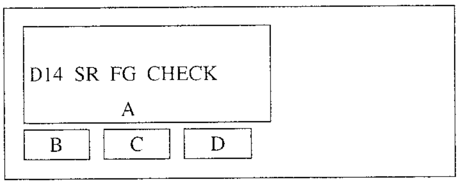
Outline

This command inspects the supply reel FG.
It confirms the duty ratio of supply reel FG A and FG B pulses.
The addresses of NOVRAM data to be confirmed are $$A884 and $$A886.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the D0 test mode or turning off the power.

Key Operation

▷ (f2) ON : Starts the self diagnosis.

Control Panel Display



A : The messages below are displayed.
"SR FG CHCK SRT" : Indicates that the self diagnosis of a "D14" supply reel FG is being executed.
"SR FG CHCK FIN" : Indicates that the self diagnosis by "D14" is completed normally.

The error message below is displayed when abnormality is detected.
"ERROR !!
S-REEL FG" : No supply reel FG can be detected or the duty ratio is abnormal.

For countermeasures, refer to Section 3-6-8. Countermeasures for Error Messages.

B : 0404 : Indicates the state in which "D14" is selected.

C : XXXX : Indicates the speed of a supply reel FG A pulse.
NTSC : Number of FG A waves that are detected for 16.6 ms
PAL : Number of FG A waves that are detected for 20.0 ms

D : XXXX : Indicates the speed of a supply reel FG B pulse.
NTSC : Number of FG B waves that are detected for 16.6 ms
PAL : Number of FG B waves that are detected for 20.0 ms

SV D15 TAPE END SENSOR GAIN DIAGNOSTIC

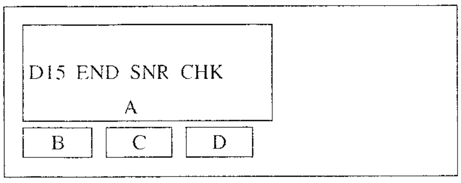
Outline

This command inspects the tape end sensor.
It confirms that the output voltage of the tape end sensor is 2.4 V.
The address of NOVRAM data to be confirmed is $A89E.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the D0 test mode or turning off the power.

Key Operation

[>] (f2) ON : Starts the self diagnosis.

Control Panel Display



A : The messages below are displayed.
"END SIR CK SRT" : Indicates that the self diagnosis of a "D15" end sensor is being executed.
"END SNR CK FIN" : Indicates that the self diagnosis by "D15" is completed normally.

The error message below is displayed when abnormality is detected.
"ERROR !!
END SENSOR" : The output of an end sensor is abnormal.

For countermeasures, refer to Section 3-6-8. Countermeasures for Error Messages.

B : 0505 : Indicates the state in which "D15" is selected.

C : --XX : Indicates the output value of an end sensor. 0 to 5 V are represented as 00H to FFH. 2.4 V is 7AH.

D : No display appears.

SV D16 TAPE TOP SENSOR GAIN DIAGNOSTICS

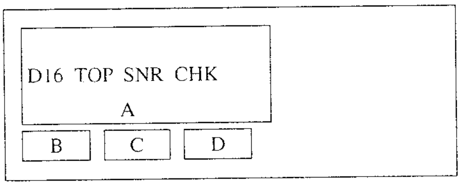
Outline

This command inspects the tape top sensor.
It confirms the output of the tape top sensor.
The address of NOVRAM data to be confirmed is $A89C.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the D0 test mode or turning off the power.

Key Operation

[>] (f2) ON : Starts the self diagnosis.

Control Panel Display



A : The messages below are displayed.
"TOP SNR CK SRT" : Indicates that the self diagnosis of a "D16" top sensor is being executed.
"TOP SNR CK FIN" : Indicates that the self diagnosis by "D16" is completed normally.

The error message below is displayed when abnormality is detected.
"ERROR !!
TOP SENSOR" : The output of a top sensor is abnormal.

For countermeasures, refer to Section 3-6-8. Countermeasures for Error Messages.

B : 0606	: Indicates the state in which "D16" is selected.
C : --XX	: Indicates the output value of a top sensor. 0 to 5 V are represented as 00H to FFH. 2.4 V is 7AH.

D : No display appears.

SV D17 TAPE CENTER (SAG) SENSOR GAIN DIAGNOSTIC

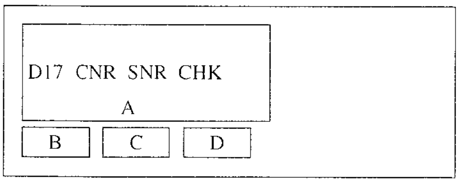
Outline

This command inspects the tape center (sag) sensor.
It confirms the output of the tape center sensor.
The address of NOVRAM data to be confirmed is $A89D.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the D0 test mode or turning off the power.

Key Operation

`>` (f2) ON : Starts the self diagnosis.

Control Panel Display



A : The messages below are displayed.

"CNR SNR CK SRT" : Indicates that the self diagnosis of a "D17" center sensor is being executed.
"CNR SNR CK FIN" : Indicates that the self diagnosis by "D17" is completed normally.

The error message below is displayed when abnormality is detected.

"ERROR !!
CENTER SENSOR" : The output of a center sensor is abnormal.

For countermeasures, refer to Section 3-6-8. Countermeasures for Error Messages.

B : 0707 : Indicates the state in which "D17" is selected.

C : --XX : Indicates the output value of a center sensor. 0 to 5 V are represented as 00H to FFH. 2.4 V is 7AH.

D : No display appears.

SV D18 T-REEL MOTOR TORQUE DIAGNOSTICS

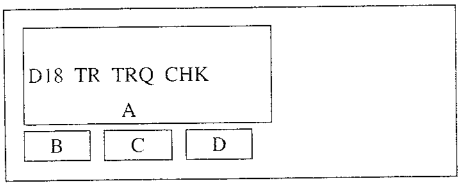
Outline

This command inspects the output torque of a take-up reel motor.
It measures the torque constant of the take-up reel motor and confirms whether the correction value is correct.
The address of NOVRAM data to be confirmed is $A88F.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the D0 test mode or turning off the power.

Key Operation

▷ (f2) ON : Starts the self diagnosis.

Control Panel Display



A : The messages below are displayed.
"TR TRQ CHK SRT" : Indicates that the self diagnosis of a "D18" take-up reel torque is being executed.
"TR TRQ CHK FIN" : Indicates that the self diagnosis by "D18" is completed normally.

The error message below is displayed when abnormality is detected.
"ERROR !!
T-REEL TORQUE": The measurement value is dispersed excessiveçly or the correction value is shifted.

For countermeasures, refer to Section 3-6-8. Countermeasures for Error Messages.

B : 0808 : Indicates the state in which "C18" is selected.

C : --XX : Indicates the correction value (NOVRAM $A88F) of a settake-up reel torque.
-25 % to + 25 % are represented as 00H to FFH.

D : --XX : Indicates the correction value of a measured take-up reel torque.
-25 % to + 25 % are represented as 00H to FFH.
The reference value is 80H.

SV D19 S-REEL MOTOR TORQUE DIAGNOSTICS

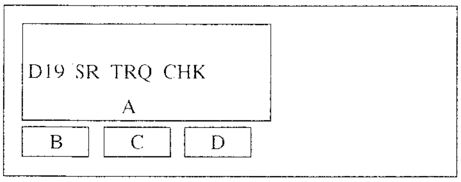
Outline

This command inspects the output torque of a supply reel motor.
It measures the torque constant of the supply reel motor and confirms whether the correction value is correct.
The address of NOVRAM data to be confirmed is $A88E.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the D0 test mode or turning off the power.

Key Operation

[>] (f2) ON : Starts the self-diagnosis.

Control Panel Display



A : The messages below are displayed.
"SR TRQ CHK SRT" : Indicates that the self diagnosis of a "D19" supply reel torque is being executed.
"SR TRQ CHK FIN" : Indicates that the self diagnosis by "D19" is completed normally.

The error message below is displayed when abnormality is detected.
"ERROR !!
S-REEL TORQUE : The measurement value disperses excessively or the correction value is shifted.

For countermeasures, refer to Section 3-6-8. Countermeasures for Error Messages.

B : 0909 : Indicates the state in which "C19" is selected.

C : --XX : Indicates the correction value (NOVRAM $A88E) of a set supply reel torque.
-25 % to + 25 % are represented as 00H to FFH.

D : --XX : Indicates the correction value of a measured supply reel torque.
-25 % to + 25 % are represented as 00H to FFH.
The reference value is 80H.

SV D1A CAPSTAN MOTOR DIAGNOSTICS

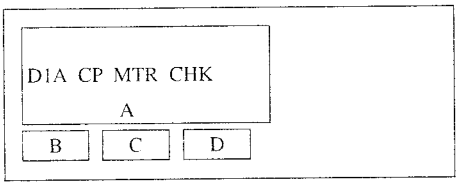
Outline

This command inspects the speed when the capstan motor is driven by a 3.5 V voltage.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the D0 test mode or turning off the power.

Key Operation

> (f2) ON : Starts the self diagnosis.

Control Panel Display



A : The messages below are displayed.

"CP MTR CHK SRT"	: Indicates that the self diagnosis of a "D1A" capstan motor is being executed.
"CP MTR CHK FIN"	: Indicates that the self diagnosis by "D1A" is completed normally. It is confirmed that the speed three seconds from when the capstan motor is driven by a 3.5 V voltage is 1.7 to 2.7 times as high as the REC speed.

The error message below is displayed when abnormality is detected.
"ERROR !!
CAPSTAN MOTOR": The capstan motor is driven by a 3.5 V voltage, but its speed is abnormal.

For countermeasures, refer to Section 3-6-8. Countermeasures for Error Messages.

B : 0A0A	: Indicates the state in which "D1A" is selected.
C : XXXX	: Indicates the capstan speed. The REC speed corresponds to 0FA0H (= 4000)

D : No display appears.

SV D1B CAPSTAN NORMAL VELOCITY DIAGNOSTICS

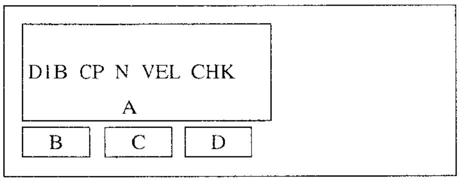
Outline

This command rotates the capstan motor at REC speed and confirms that the reference value is adjusted so that the output from a speed error measuring instrument is minimum.
The address of NOVRAM data to be confirmed is $$A8C2.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the D0 test mode or turning off the power.

Key Operation

>	(f2) ON : Starts the self diagnosis.

Control Panel Display



A : The messages below are displayed.
"CP NVEL CK SRT" : Indicates that the self diagnosis of a "D1B" capstan REC speed is being executed.
"CP NVEL CK FIN" : Indicates that the self diagnosis by "D1B" is completed normally.

The error messages below are displayed when abnormality is detected.
"ERROR !!
CAPSTAN MOTOR": The capstan motor cannot be rotated at REC speed.
"ERROR !!
CP NVL UNSTBL" : The driving voltage of a capstan motor fluctuates excessively.
"ERROR !!
CP NORM VELO" : The output form a speed error measuring instrument is abnormal.

For countermeasures, refer to Section 3-6-8. Countermeasures for Error Messages.

B : 0B0B : Indicates the state in which "D1B" is selected.

C : XXXX : Indicates the capstan speed.
The REC speed corresponds to 0FA0H (= 4000).

D : No display appears.

SV D1C CAPSTAN F. FORMAT VELOCITY DIAGNOSTICS

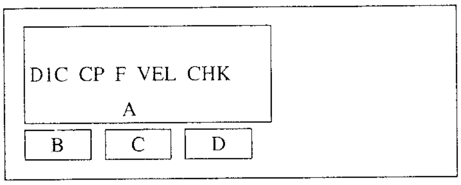
Outline

This command rotates the capstan motor at fast format speed and confirms that the reference value is adjusted so that the output from a speed error measuring instrument is minimum.
The address of NOVRAM data to be confirmed is $$A8C4.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the D0 test mode or turning off the power.

Key Operation

[>] (f2) ON : Starts the self diagnosis.

Control Panel Display



A : The messages below are displayed.
"CP FVEL CK SRT" : Indicates that the self diagnosis of a "D1C" capstan REC speed is being executed.
"CP FVEL CK FIN" : Indicates that the self diagnosis by "D1C" is completed normally.

The error messages below are displayed when abnormality is detected.
"ERROR !!
CAPSTAN MOTOR": The capstan motor cannot be rotated at fast format speed.
"ERROR !!
CP FVL UNSTBL" : The driving voltage of a capstan motor fluctuates excessively.
"ERROR !!
CP FFOR VELO" : The output from a speed error measuring instrument is abnormal.

For countermeasures, refer to Section 3-6-8. Countermeasures for Error Messages.

B : 0C0C : Indicates the state in which "D1C" is selected.

C : XXXX : Indicates the capstan speed.
The fast format speed corresponds to 2EE0H (= 12000).

D : No display appears.

SV D1D CAPSTAN FG GAIN DIAGNOSTICS

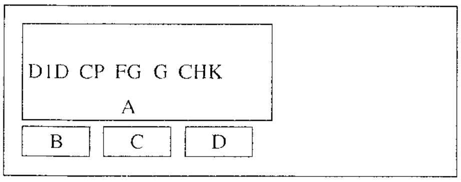
Outline

This command measures the amplitude of a capstan FG pulse and confirms that the internal gain constant is adjusted correctly.
The addresses of NOVRAM data to be confirmed are $A88C and $A88D.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the D0 test mode or turning off the power.

Key Operation

[>] (f2) ON : Starts the self diagnosis.

Control Panel Display



A : The messages below are displayed.
"CP FG G CK SRT" : Indicates that the self diagnosis of a "D1D" capstan FG gain is being executed.
"CP FG G CK FIN" : Indicates that the self diagnosis by "D1D" is completed normally.

The error messages below are displayed when abnormality is detected.
"ERROR !!
CAPSTAN MOTOR": The capstan motor cannot be rotated at specified speed.
"ERROR !!
CAP FG LEVEL" : The amplitude of a capstan motor FG pulse.

For countermeasures, refer to Section 3-6-8. Countermeasures for Error Messages.

B : 0D0D : Indicates the state in which "D1D" is selected.

C : XXXX : Indicates the capstan speed.
The REC speed corresponds to 0FA0H (= 4000).

D : No display appears.

SV D1E T-REEL BRAKE FORCE DIAGNOSTICS

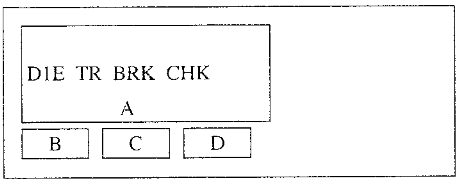
Outline

This command inspects the take-up reel brake force.
It measures the brake force of a take-up reel motor and confirms that the brake force satisfies the specification.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the D0 test mode or turning off the power.

Key Operation

[>] (f2) ON : Starts the self diagnosis.

Control Panel Display



A : The messages below are displayed.
"TR BRK CHK SRT" : Indicates that the self diagnosis of a "D1E" take-up reel brake force is being executed.
"TR BRK CHK FIN" : Indicates that the self diagnosis by "D1E" is completed normally.

The error message below is displayed when abnormality is detected.
"ERROR !!
T-REEL BRAKE" : The brake force is abnormal.

For countermeasures, refer to Section 3-6-8. Countermeasures for Error Messages.

B : 0E0E : Indicates the state in which "D1E" is selected.

C : XXXX : Indicates the measurement value of a brake force in the clockwise rotation. The unit is gf·cm in decimals.

D : XXXX : Indicates the measurement value of a brake force in the counterclockwise rotation. The unit is gf·cm in decimals.

Specification :

This self diagnosis must be completed normally.
DVR-20 : The brake force in the clockwise rotation is 2.94 to 8.83×10^{-3} N·m (30 to 90 gf·cm).
The brake force in the counterclockwise rotation is 19.61 to 68.65×10^{-3} N·m (200 to 700 gf·cm).
DVR-28 : The brake force in the clockwise rotation is 7.85 to16.67$\times10^{-3}$ N·m (80 to 170 gf·cm).
The brake force in the counterclockwise rotation is 53.94 to 98.07×10^{-3} N·m (550 to 1000 gf·cm).

SV D1F S-REEL BRAKE FORCE DIAGNOSTICS

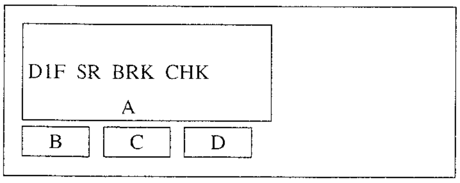
Outline

This command inspects the supply reel brake force.
It measures the brake force of a supply reel motor and confirms that the brake force satisfies the specification.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the D0 test mode or turning off the power.

Key Operation

`>` (f2) ON :

Control Panel Display



A : The messages below are displayed.
"SR BRK CHK SRT" : Indicates that the self diagnosis of a "D1F" supply reel brake force is being executed.
"SR BRK CHK FIN" : Indicates that the self diagnosis by "D1F" is completed normally.

The error message below is displayed when abnormality is detected.
"ERROR !!
S-REEL BRAKE" : The brake force is abnormal.

For countermeasures, refer to Section 3-6-8. Countermeasures for Error Messages.

B : 0F0F : Indicates the state in which "D1F" is selected.

C : XXXX : Indicates the measurement value of a brake force in the clockwise rotation. The unit is gf·cm in decimals.

D: XXXX : Indicates the measurement value of a brake force in the counterclockwise rotation. The unit is gf·cm in decimals.

Specification :
This self diagnosis must be completed normally.
DVR-20 : The brake force in the counterclockwise rotation is 2.94 to 8.83×10^{-3} N·m (30 to 90 gf·cm).
The brake force in the clockwise rotation is 19.61 to 68.65×10^{-3} N·m (200 to 700 gf·cm).
DVR-28 : The brake force in the counterclockwise rotation is 7.85 to 16.67×10^{-3} N·m (80 to 170 gf·cm).
The brake force in the clockwise rotation is 53.94 to 98.07×10^{-3} N·m (550 to 1000 gf·cm).

SV D21 T-REEL TENSION SENSOR DIAGNOSTICS

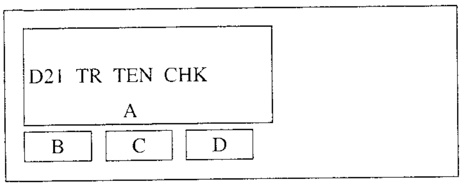
Outline

This command inspects the take-up reel tension sensor.
It electrically confirms that offset and gain adjustments satisfy the specification on the assumption that the spring has been adjusted.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the D0 test mode or turning off the power.

Key Operation

[>] (f2) ON : Starts the self diagnosis.

Control Panel Display



A : The messages below are displayed.
"TR TEN CHK SRT" : Indicates that the self diagnosis of a "D21" take-up reel tension is being executed.
"TR TEN CHK FIN" : Indicates that the self diagnosis by "D21" is completed normally.

The error message below is displayed when abnormality is detected.
"ERROR !!
T-REEL TENSION" : The tension data is abnormal.

For countermeasures, refer to Section 3-6-8. Countermeasures for Error Messages.

B : 1010 : Indicates the state in which "D21" is selected.

C : --XX : Displays the take-up tension data.
DVR-20 : Corresponds to 00H when a "T TEN" signal (at TP40) on the SV-133 board is 0 V.
Corresponds to FFH when it is 5 V.
DVR-28 : Corresponds to 00H when a "T TEN" signal (at TP40) on the SSP-07 board is 0 V.
Corresponds to FFH when it is 5 V.
Indicates the tension data when 0 g and 42 g inspections are performed.

D : No display appears.

SV D22 S-REEL TENSION SENSOR DIAGNOSTICS

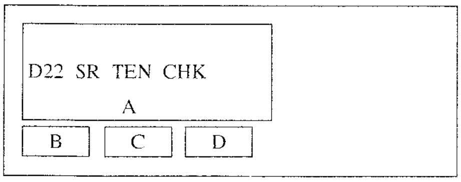
Outline

This command inspects the supply reel tension sensor.
It electrically confirms that offset and gain adjustments satisfy the specification on the assumption that the spring has been adjusted.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the D0 test mode or turning off the power.

Key Operation

> (f2) ON : Starts the self diagnosis.

Control Panel Display



A : The messages below are displayed.
"SR TEN CHK SRT" : Indicates that the self diagnosis of a "D22" supply reel tension is being executed.
"SR TEN CHK FIN" : Indicates that the self diagnosis by "D22" is completed normally.

The error message below is displayed when abnormality is detected.
"ERROR !!
S-REEL TENSION" : The tension data is abnormal.

For countermeasures, refer to Section 3-6-8. Countermeasures for Error Messages.

B : 1111 : Indicates the state in which "D22" is selected.

C : --XX : Displays the supply tension data.
DVR-20 : Corresponds to 00H when an "S TEN" signal (at TP39) on the SV-133 board is 0 V.
Corresponds to FFH when it is 5 V.
DVR-28 : Corresponds to 00H when an "S TEN" signal (at TP39) on the SSP-07 board is 0 V.
Corresponds to FFH when it is 5 V.
Indicates the tension data when 0 g and 55 g inspections çare performed.

D : No display appears.

SV D23 DRUM LOCK UP DIAGNOSTICS

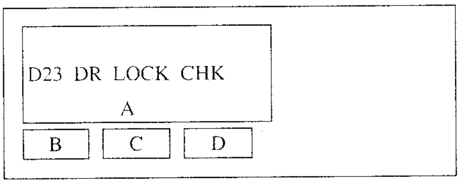
Outline

This command inspects the rise time (lock-up time) and fall time (stop time) of a drum motor.
The rise time and fall time are completed in approximately 20 seconds.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the D0 test mode or turning off the power.

Key Operation

▷ (f2) ON : Starts the self diagnosis.

Control Panel Display



A : The messages below are displayed.
"DR LOCK CK SRT" : Indicates that the self diagnosis of a "D24" drum lock time is being executed.
"DR LOCK CK FIN" : Indicates that the self diagnosis by "D24" is completed normally.

The error message below is displayed when abnormality is detected.
"ERROR !!
DRUM LOCK TIME" : The drum motor cannot be rotated at specified speed, or the drum motor's rise time and fall time are abnormal.

For countermeasures, refer to Section 3-6-8. Countermeasures for Error Messages.

B : XXXX : Indicates the time (number of fields) from when the self diagnosis is initiated.
NTSC : One second 003CH PAL : One second 0032H

C : --XX : Indicates the drum mode flag.
01H : Drum stop 78H : Drum lock

D : --XX : Indicates the measured rise time (lock-up time).
NTSC : 4 seconds 78H PAL : 4 seconds 64H

XX-- : Indicates the measured fall time (stop time).
NTSC : 6 seconds B4H PAL : 6 seconds 96H

SV D24 DRUM PG POLARITY DIAGNOSTICS

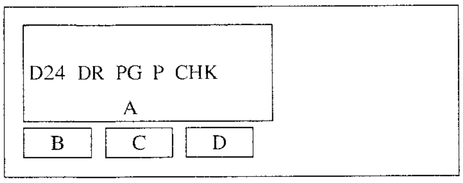
Outline

This command measures the FG polarity for a drum PG pulse and confirms that the polarity is adjusted correctly.
It starts the drum motor, measures the FG polarity, and displays the result compared with the adjusted data.
The address of NOVRAM data to be confirmed is $A8D0.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the D0 test mode or turning off the power.

Key Operation

`>` (f2) ON : Starts the self diagnosis.

Control Panel Display



A : The messages below are displayed.
"DR PG P CK SRT" : Indicates that the self diagnosis of a "D24" drum PG polarity is being executed.
"DR PG P CK FIN" : Indicates that the self diagnosis by "D24" is completed normally.

The error message below is displayed when abnormality is detected.
"ERROR !!
DR PG POLARITY" : The drum motor cannot be rotated at the specified speed or the result obtained when the PG polarity is measured does not coincide with the adjusted data.

For countermeasures, refer to Section 3-6-8. Countermeasures for Error Messages.

B : XXXX : Indicates the time (number of fields) from when the self diagnosis is initiated.
NTSC : One second 003CH PAL : One second 0032H

C : --XX : Indicates the drum mode flag.
01H: Drum stop 78H: Drum lock

D : --XX : Indicates the adjustment value (NOVRAM $A8D0) of drum PG polarity.
NTSC : 5AH or 5BH PAL : 58H or 59H

SV D25 DRUM VELOCITY DIAGNOSTICS

Outline

This command inspects the drum speed loop adjustment.
It starts the drum motor and confirms the error voltage.
The addresses of NOVRAM data to be confirmed are $A897 to $A89B.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the D0 test mode or turning off the power.

Key Operation

[>] (f2) ON : Starts the self diagnosis.

Control Panel Display

```
D25 DR VELO CHK
       A
  B      C      D
```

A : The messages below are displayed.
"DR VELO CK SRT" : Indicates that the self diagnosis of a "D25" drum PG polarity is being executed.
"DR VELO CK FIN" : Indicates that the self diagnosis by "D25" is completed normally.

The error message below is displayed when abnormality is detected.
"ERROR !!
DRUM VELOCITY" : The drum motor cannot be rotated at the specified speed or the measured error voltage is abnormal.

For countermeasures, refer to Section 3-6-8. Countermeasures for Error Messages.

B : XXXX : Indicates the time (number of fields) from when the self diagnosis is initiated.
NTSC : One second 003CH PAL : One second 0032H

C : --XX : Indicates the drum mode flag.
01H : Drum stop 78H : Drum lock

D : XXXX : Indicates the maximum value of an error voltage.
2.5 V : 4000H

SV D26 DRUM PG JITTER DIAGNOSTICS

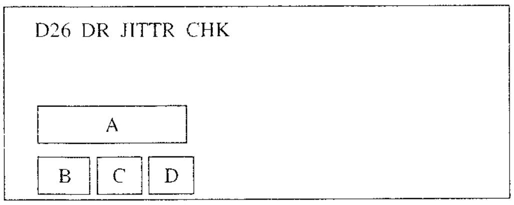
Outline

This command inspects the drum PG jitter.
It starts the drum motor and confirms the maximum value of the PG jitter.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the D0 test mode or turning off the power.

Key Operation

[>] (f2) ON : Starts the self diagnosis.

Control Panel Display



A : The messages below are displayed.
"DR JITR CK SRT" : Indicates that the self diagnosis of a "D27" drum PG jitter is being executed.
"DR JITR CK FIN" : Indicates that the self diagnosis by "D27" is completed normally.

The error message below is displayed when abnormality is detected.
"ERROR !!
DRUM PG JITTER" : The drum motor cannot be rotated at the specified speed or the maximum value of a measured PG jitter is abnormal.

For countermeasures, refer to Section 3-6-8. Countermeasures for Error Messages.

B : XXXX : Indicates the time (number of fields) from when the self diagnosis is initiated.
NTSC : One second 003CH PAL : One second 0032H

C : --XX : Indicates the drum mode flag.
01H : Drum stop 78H : Drum lock

D : --XX : Indicates the maximum value of a measured PG jitter.
3 us : 0BH

SV D27 THREAD DIAGNOSTICS

Outline

This command checks the threading or unthreading operation and the TTP sensor.
The check consists of the steps below.

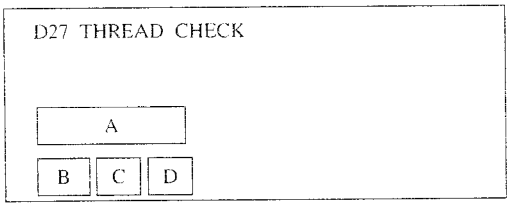
DVR-20 / 28
0. UNTHREADING : Moves the arm to the unthreading position and confirms that the operation is completed within five seconds.
1. UNTHREAD HOLD CHECK : Confirms that the arm properly stops in the unthreading position for two seconds.
2. TTP SENSOR CHECK : Confirms the sensitivity and shielding state of the sensor by changing the light-emitting amount of a TTP sensor to 0 %, 75 %, 100 %, or 180 %.
3. THREADING : Moves the arm to the threading position and confirms that the operation is completed within five seconds.
4. THREAD HOLD CHECK : Confirms that the arm properly stops in the threading position for two seconds.
5. SENSOR CHECK : Confirms the sensitivity and shielding state of the sensor by changing the light-emitting amount of a TTP sensor to 0 %, 75 %, 100 %, or 180 %.
6. UNTHREADING : Moves the arm to the unthreading position and confirms that the operation is completed within five seconds.
7. UNTHREAD HOLD CHECK : Confirms that the arm properly stops in the unthreading position for two seconds.

Each check is performed by the function key operation.
The operation in this test mode uses sensor information to turn on or off a motor and perform a power control in the same manner as for the ordinary operation.
This test mode must be put when the VTR is in the EJECT state and when the cassette compartment is in the UP position, with the pinch turned off.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the D0 test mode or turning off the power.

Key Operation

< (f1) : The check is stopped.
> (f2) : The check is started.

Control Panel Display



A :
"THREAD CHK STR" : Indicates that a check is in execution.
"THREAD CHK FIN" : The check is completed normally.

"ERROR !!
THREAD MOTOR" : The threading or unthreading operation is not completed within the specified time or the thread hold or unthread hold operation is not performed properly.

For the error messages below, sensor shielding or transmission state may be defective.

"ERROR !!
CCM UP SENSOR" : (DVR-20) Cassette compartment up sensor
(DVR-28) Inner cassette compartment up sensor
Outer cassette compartment up sensor

"ERROR !!
CST IN SENSOR" : Cassette in sensor

"ERROR !!
CST SIZE SNR" : (DVR-20) Cassette size sensor
(DVR-28) Cassette size sensor M
Cassette size sensor L

"ERROR !!
CST DOWN SNR" : (DVR-20) Cassette compartment down sensor
(DVR-28) Inner cassette compartment down sensor
Outer cassette compartment down sensor

"ERROR !!
M SIDE SENSOR" : (DVR-20) Reel shift sensor (M)
(DVR-28) Reel shift sensor (S reel)

"ERROR !!
S SIDE SENSOR" : (DVR-20) Reel shift sensor (S)
(DVR-28) Reel shift sensor (T reel)

"ERROR !!
USR (CNR M) SNR" : (DVR-20) User center sensor (M cassette)
(DVR-28) Center sensor (M cassette)
Center sensor (L cassette)

"ERROR !!
USR (CNR S) SNR" : User center sensor (S cassette)

"ERROR !!
USR (S SIDE) SNR" : S-side user sensor

"ERROR !!
USR (T SIDE) SNR" : T-side user sensor

"ERROR !!
REC INH SENSOR" : Cassette loading sensor

"ERROR !!
CORD HOLE 1 SNR" : Cassette loading sensor 1

"ERROR !!
CORD HOLE 2 SNR" : Cassette loading sensor 2

"ERROR !!
CORD HOLE 3 SNR" : Cassette loading sensor 3

"ERROR !!
CORD HOLE 4 SNR" : Cassette loading sensor 4

For countermeasures, refer to Section 3-6-8. Countermeasures for Error Messages.

B : --XX : Displays the thread check step.

C : --XX : Displays the execution time of each check step.

D : Displays the threading position data.

```
- - XX
    └──► THREADING  POSITION  DATA
```

Specification

EDH in the threading position
Unthread value = NOVRAM $A8A0

SV D28 CASSETTE COMPARTMENT DIAGNOSTICS

Outline

This command checks the cassette compartment down or up operation and the TTP sensor.
The check consists of the steps below.

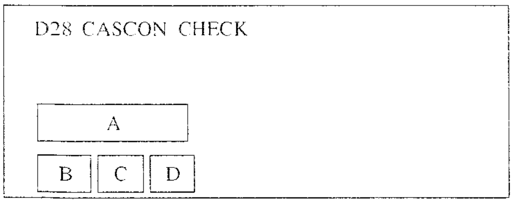
DVR-20 / 28
0. CASSETTE COMPARTMENT UP : Performs the up operation and confirms that the operation is completed within five seconds.
1. UP HOLD CHECK : Confirms that the cassette compartment stops in the up position for two seconds.
2. TTP SENSOR CHECK : Confirms the sensitivity and shielding state of the sensor by changing the light-emitting amount of a TTP sensor to 0 %, 75 %, 100 %, or 180 %.
3. CASSETTE COMPARTMENT DOWN : Performs the down operation and confirms that the operation is completed within five seconds.
4. DOWN HOLD CHECK : Confirms the sensitivity and shielding state of the sensor by changing the light-emitting amount of a TTP sensor to 0 %, 75 %, 100 %, or 180 %.
5. TTP SENSOR CHECK : Confirms the sensitivity and shielding state of the sensor by changing the light-emitting amount of a TTP sensor to 0 %, 75 %, 100 %, or 180 %.
6. UP HOLD CHECK : Confirms that the cassette compartment stops in the up position for two seconds.
7. TTP SENSOR CHECK : Confirms the sensitivity and shielding state of the sensor by changing the light-emitting amount of a TTP sensor to 0 %, 75 %, 100 %, or 180 %.

Each check is performed by the function key operation.
The operation in the D28 test mode uses sensor information to turn on or off a motor and perform a power control in the same manner as for the ordinary operation.
This test mode must be put when the VTR is in the EJECT state and when the threading arm is in the unthreading position, with no cassette in the compartment.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the D0 test mode or turning off the power.

Key Operation

[<] (f1) : The check is stopped.
[>] (f2) : The check is started.

Control Panel Display



A:
"CASCON CHK STR" : Indicates that a check is in execution.
"CASCON CHK FIN" : The check is completed normally.

"ERROR !!
CASSECON MOTOR" : The cassette compartment up or down operation is not completed within the specified time, or the cassette compartment up or down hold operation is not performed properly.

For the error messages below, sensor shielding or transmission state may be defective.

"ERROR !!
CCM UP SENSOR" : (DVR-20) Cassette compartment up sensor
(DVR-28) Inner cassette compartment up sensor
Outer cassette compartment up sensor

"ERROR !!
CST IN SENSOR" : Cassette in sensor

"ERROR !!
CST SIZE SNR" : (DVR-20) Cassette compartment size sensor
(DVR-28) Cassette size sensor M
Cassette size sensor L

"ERROR !!
CST DOWN SNR" : (DVR-20) Cassette compartment down sensor
(DVR-28) Inner cassette compartment down sensor
Outer cassette compartment down sensor

"ERROR !!
M SIDE SENSOR" : (DVR-20) Reel shift sensor (M)
(DVR-28) Reel shift sensor (S reel)

"ERROR !!
S SIDE SENSOR" : (DVR-20) Reel shift sensor (S)
(DVR-28) Reel shift sensor (T reel)

"ERROR !!
USR (CNR M) SNR" : (DVR-20) User center sensor (M cassette)
(DVR-28) Center sensor (M cassette)
Center sensor (L cassette)

"ERROR !!
USR (CNR S) SNR" : User center sensor (S cassette)

"ERROR !!
USR (S SIDE) SNR" : S-side user sensor

"ERROR !!
USR (T SIDE) SNR" : T-side user sensor

"ERROR !!
REC INH SENSOR" : Cassette loading sensor

"ERROR !!
CORD HOLE 1 SNR" : Cassette loading sensor 1

"ERROR !!
CORD HOLE 2 SNR" : Cassette loading sensor 2

"ERROR !!
CORD HOLE 3 SNR" : Cassette loading sensor 3

"ERROR !!
CORD HOLE 4 SNR" : Cassette loading sensor 4

For countermeasures, refer to Section 3-6-8. Countermeasures for Error Messages.

B : --XX : Displays the cassette compartment check step.

C : --XX : Displays the execution time of each check step.

D : Displays the control value of a cassette compartment.

DVR-20 series
- - XX
└→ CASSETTE COMPARTMENT CONTROL

DVR-28 series
XXXX
└→ INNER CASSETTE COMPARTMENT CONTROL
└→ OUTER CASSETTE COMPARTMENT CONTROL

SV D29 REEL SHIFT DIAGNOSTICS

Outline

This command checks the reel shift operation and the TTP sensor.
The check consists of the steps below.

DVR-20

0. REEL SHIFT M : Performs the reel shift M operation and confirms that the operation is completed within three seconds.
1. M-POSITION HOLD CHECK : Confirms that the reel stops in the M position for two seconds.
2. TTP SENSOR CHECK : Confirms the sensitivity and shielding state of the sensor by changing the light-emitting amount of a TTP sensor to 0 %, 75 %, 100 %, or 180 %.
3. REEL SHIFT S : Performs the reel shift S operation and confirms that the operation is completed within three seconds.
4. S-POSITION HOLD CHECK : Confirms that the reel stops in the S position for two seconds.
5. TTP SENSOR CHECK : Confirms the sensitivity and shielding state of the sensor by changing the light-emitting amount of a TTP sensor to 0 %, 75 %, 100 %, or 180 %.
6. REEL SHIFT M : Performs the reel shift M operation and confirms that the operation is completed within three seconds.
7. M-POSITION HOLD CHECK : Confirms that the reel stops in the M position for two seconds.

DVR-28

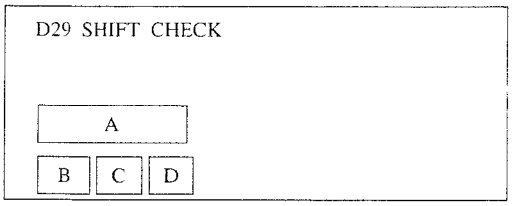
0. REEL SHIFT S : Performs the reel shift S operation and confirms that the operation is completed within three seconds.
1. S-POSITION HOLD CHECK : Confirms that the reel stops in the S position for two seconds.
2. TTP SENSOR CHECK : Confirms the sensitivity and shielding state of the sensor by changing the light-emitting amount of a TTP sensor to 0 %, 75 %, 100 %, or 180 %.
3. REEL SHIFT M : Performs the reel shift M operation and confirms that the operation is completed within three seconds.
4. M-POSITION HOLD CHECK : Confirms that the reel stops in the M position for two seconds.
5. TTP SENSOR CHECK : Confirms the sensitivity and shielding state of the sensor by changing the light-emitting amount of a TTP sensor to 0 %, 75 %, 100 %, or 180 %.
6. REEL SHIFT L : Performs the reel shift L operation and confirms that the operation is completed within three seconds.
7. L-POSITION HOLD CHECK : Confirms that the reel stops in the L position for two seconds.
8. TTP SENSOR CHECK : Confirms the sensitivity and shielding state of the sensor by changing the light-emitting amount of a TTP sensor to 0 %, 75 %, 100 %, or 180 %.
9. REEL SHIFT M
10. M-POSITION HOLD CHECK
11. TTP SENSOR CHECK
12. REEL SHIFT S
13. S-POSITION HOLD CHECK
14. TTP SENSOR CHECK
15. REEL SHIFT L
16. L-POSITION HOLD CHECK
17. TTP SENSOR CHECK
18. REEL SHIFT S
19. S-POSITION HOLD CHECK
20. TTP SENSOR CHECK

Each check is performed by the function key operation.
The operation in the D29 test mode uses sensor information to turn on or off a motor and perform a power control in the same manner as for the ordinary operation.
This test mode must be put when the VTR is in the EJECT state and when the cassette compartment is in the up position.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the D0 test mode or turning off the power.

Key Operation

< (f1) : The check is stopped.
> (f2) : The check is started.

Control Panel Display



A :
"SHIFT CHCK STR" : Indicates that a check is in execution.
"SHIFT CHCK FIN" : The check is completed normally.

"ERROR !!
SHIFT MOTOR" : The reel shift operation is not completed within the specified time or the reel shift hold operation is not performed properly.

For the error messages below, sensor shielding or transmission state may be defective.

"ERROR !!
CCM UP SENSOR" : (DVR-20) Cassette compartment up sensor
(DVR-28) Inner cassette compartment up sensor
Outer cassette compartment up sensor

"ERROR !!
CST IN SENSOR" : Cassette in sensor

"ERROR !!
CST SIZE SNR" : (DVR-20) Cassette compartment size sensor
(DVR-28) Cassette size sensor M
Cassette size sensor L

"ERROR !!
CST DOWN SNR" : (DVR-20) Cassette compartment down sensor
(DVR-28) Inner cassette compartment down sensor
Outer cassette compartment down sensor

"ERROR !!
M SIDE SENSOR" : (DVR-20) Reel shift sensor (M)
(DVR-28) Reel shift sensor (S reel)

"ERROR !!
S SIDE SENSOR" : (DVR-20) Reel shift sensor (S)
(DVR-28) Reel shift sensor (T reel)

"ERROR !!
USR (CNR M) SNR" : (DVR-20) User center sensor (M cassette)
(DVR-28) Center sensor (M cassette)
Center sensor (L cassette)

"ERROR !!
USR (CNR S) SNR" : User center sensor (S cassette)

"ERROR !!
USR (S SIDE) SNR" : S-side user sensor

"ERROR !!
USR (T SIDE) SNR" : T-side user sensor

"ERROR !!
REC INH SENSOR" : Cassette loading sensor

"ERROR !!
CORD HOLE 1 SNR" : Cassette loading sensor 1

"ERROR !!
CORD HOLE 2 SNR" : Cassette loading sensor 2

"ERROR !!
CORD HOLE 3 SNR" : Cassette loading sensor 3

"ERROR !!
CORD HOLE 4 SNR" : Cassette loading sensor 4

For countermeasures, refer to Section 3-6-8. Countermeasures for Error Messages.

B : --XX : Displays the reel shift check step.

C : --XX : Displays the execution time of each check step.

D : Displays the reel shift position data of the DVR-28 board.

```
- - XX
    └─→ DVR-28 REEL SHIFT POSITION DATA
        (L-CASSETTE POSITION DATA > S-CASSETTE POSITION DATA)
```

Specifications

1. 6FH +- 01H = A is obtained when the cassette compartment moves from L-cassette position to M-cassette position and when the take-up reel spring contracts. Value A - 30H = NOVRAM $A8AD.
2. Value A +- 03H = B is obtained when the cassette compartment moves from S-cassette position to M-cassette position and when the supply reel spring contracts. Value B + 30H = NOVRAM $A8AE.
3. The value when the cassette compartment moves to the S-cassette position and when the take-up reel spring contracts is NOVRAM $A8AC.
4. The value when the cassette compartment moves to the L-cassette position and when the supply reel spring contracts is NOVRAM $A8AF.

SV D2A OTHER SENSORS DIAGNOSTICS

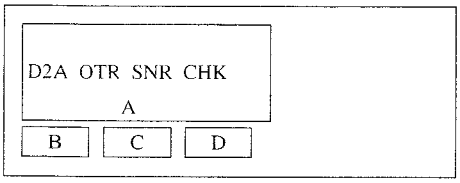
Outline

This command checks the TTP sensor.
The check is performed by the function key operation.
This command confirms the sensitivity and shielding state of the sensor by changing the light-emitting amount of a TTP sensor to 0 %, 75 %, 100 %, or 180 %.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the D0 test mode or turning off the power.

Key Operation

< (f1) : The check is stopped.
> (f2) : The check is started.

Control Panel Display



A :
"OTR SNR CK STR" : Indicates that a check is in execution.
"OTR SNR CK FIN" : Indicates that a check is in execution.

For the error messages below, sensor shielding or transmission state may be defective.

"ERROR !!
CCM UP SENSOR" : (DVR-20) Cassette compartment up sensor
(DVR-28) Inner cassette compartment up sensor
Outer cassette compartment up sensor

"ERROR !!
CST IN SENSOR" : Cassette in sensor

"ERROR !!
CST SIZE SNR" : (DVR-20) Cassette compartment size sensor
(DVR-28) Cassette size sensor M
Cassette size sensor L

"ERROR !!
CST DOWN SNR" : (DVR-20) Cassette compartment down sensor
(DVR-28) Inner cassette compartment down sensor
Outer cassette compartment down sensor

"ERROR !!
M SIDE SENSOR" : (DVR-20) Reel shift sensor (M)
(DVR-28) Reel shift sensor (S reel)

"ERROR !!
S SIDE SENSOR" : (DVR-20) Reel shift sensor (S)
(DVR-28) Reel shift sensor (T reel)

"ERROR !!
USR (CNR M) SNR" : (DVR-20) User center sensor (M cassette)
(DVR-28) Center sensor (M cassette)
Center sensor (L cassette)

"ERROR !!
USR (CNR S) SNR" : User center sensor (S cassette)

"ERROR !!
USR (S SIDE) SNR" : S-side user sensor

"ERROR !!
USR (T SIDE) SNR" : T-side user sensor

"ERROR !!
REC INH SENSOR" : Cassette loading sensor

"ERROR !!
CORD HOLE 1 SNR" : Cassette loading sensor 1

"ERROR !!
CORD HOLE 2 SNR" : Cassette loading sensor 2

"ERROR !!
CORD HOLE 3 SNR" : Cassette loading sensor 3

"ERROR !!
CORD HOLE 4 SNR" : Cassette loading sensor 4

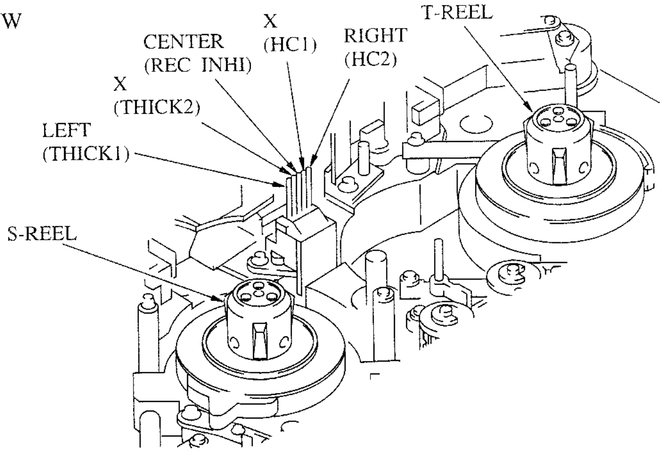
For countermeasures, refer to Section 3-6-8. Countermeasures for Error Messages.

B : --XX : Displays the other sensor check step.

C : - - XXXXXXXB Displays binary data in hexadecimals.
→ 1 : T-REEL SIDE USER FREE 0 : PUSH
→ 1 : CORDING HOLE THICK1 FREE 0 : PUSH
→ 1 : CORDING HOLE THICK2 FREE 0 : PUSH
→ 1 : RECORD INHIBIT SW FREE 0 : PUSH
→ 1 : CORDING HOLE HC1 FREE 0 : PUSH
→ 1 : CORDING HOLE HC2 FREE 0 : PUSH
→ 1 : T-REEL SIDE USER FREE 0 : PUSH

NOTE :

SWITCH POSITION VIEW



D : - - XXXB Displays binary data in hexadecimals.
→ 1 : S-CASSETTE CENTER USER FREE 0 : PUSH
→ 1 : M-CASSETTE CENTER USER FREE 0 : PUSH
→ 1 : L-CASSETTE CENTER USER FREE 0 : PUSH (DVR-28のみ)

SV D2F DRUM WAVEFORM DIAGNOSTICS

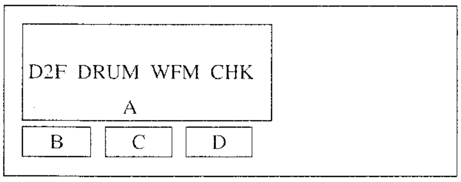
Outline

This command inspects the drum PG and FG waveforms (does not inspect automatically them).
It starts and locks the drum motor.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the D0 test mode or turning off the power.

Key Operation

<	(f1) ON : The check is stopped.
>	(f2) ON : The check is started.

Control Panel Display



A : The messages below are displayed.

"DR WFM CHK SRT"	: Indicates that the inspection of a "D2F" drum PG / FG waveform is being executed. The inspection automatically stops after ten minutes.
"DR WFM CHK FIN"	: The inspection of a "D2F" drum PG / FG waveform is completed.

B : No display appears.

C : --XX : Indicates the drum mode flag.
01H: Drum stop 78H: Drum lock

D : No display appears.

Specification

Confirm that a drum FG A signal (CN411-27C on the SP-15 board) and a drum FG B signal (CN411-28B on the SP-15 board) satisfy the conditions below.
The signal amplitude must be more than 1.5 V and less than 2.5 V.
The signal's DC level must be more than 4.2 V and less than 6.2 V.
Confirm that a drum PG signal (CN411-28C on the SP-15 board) satisfies the conditions below.
The signal amplitude must be more than 0.5 V and less than 1.1 V.
The signal's noise level must be less than 0.13 Vp-p.

3-6-6. UC Test Mode Menu

The UC (Ultra Sonic Guide control) test mode has the modes below.

(1) Mode C : Automatic adjustment mode.
The automatic adjustment mode is used for USG.
adjustment. In the automatic adjustment mode, another mode cannot be converted.

(2) Mode D : Self-diagnosis mode
The self-diagnosis mode is used for USG diagno-sis.
In the self-diagnosis mode, another mode cannot be converted.

To perform the UC test mode, shift the USG to the threading position in accordance with the procedure below.

(1) Turn the main power on.
(2) Press the TEST key.
(3) Press the F6 (CHECKER) key.
(4) Press the F1 (SP) key.
(5) Press the F6 (F) key, the 2 and 5 keys of a 20-key, and the SET key.
(6) Confirm that the "F25 THREAD" message is displayed.
(7) Press cursor key < (f1) key continuously to enter the loading state.
(8) Press the F12 (EXIT) key.

The UC test mode can be performed in accordance with the procedure below after the above operation.
(1) Press the TEST key.
(2) Press the F6 (CHECKER) key.
(3) Press the F3 (UC) key.
(4) The test mode item is specified and press the SET key.

Cancel the SP test mode in accordance with the procedure below after the UC test mode is terminated.
(1) Press the TEST key.
(2) Press the F6 (CHECKER) key.
(3) Press the F1 (SP) key.
(4) Press the F6 (F) key, the 2 and 0 keys of a 20-key, and the SET key.
(5) Press the F12 (EXIT) key.

List of UC Test Mode Items

Mode	Description
$, $$	MEMORY READ/WRITE
=0	UC RESET
C0	TEST MODE OFF (C mode cancellation)
C11	AUTO US ADJUSTMENT
C12	S-US OFFSET ADJUSTMENT
C13	T-US OFFSET ADJUSTMENT
C14	S-US GAIN ADJUSTMENT
C15	T-US GAIN ADJUSTMENT
D0	TEST MODE OFF (D mode cancellation)
D11	AUTO US CHECK
D12	S-USG CHECK
D13	T-USG CHECK

UC $, $$ MEMORY READ / WRITE

Outline

This command can read or write the data of the memory specified by UC CPU in bytes or words.
$ is used to read or write data in bytes, and $$ to read or write it in words.
This command is used in the factory.
If the NOVRAM data is changed, the VTR does not operate normally.

Note : This command cannot change NOVRAM data.
To change the NOVRAM data, enter the SP $, $$ command in an SP test mode menu.

UC =0 UC RESET

Outline

Entering this command can reset the UC board.

Operation

Enter the = 0 command using the function keys and numeric keypad on the control panel.

Control Panel Display

```
=0
```

UC C11 : AUTO US ADJUSTMENT

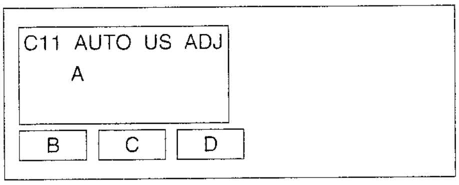
Outline

The supply and take-up USGs can be automatically adjusted in this test mode.
The automatic adjustment of "C12", "C13", "C14", and "C15" can be performed continuously.

Key operation

[>] (f2) ON : Starts the automatic adjustment.

Control Panel Display



A : The message below is displayed.
S-US OFS AJ SRT : C12 automatic alignment is being performed.
T-US OFS AJ SRT : C13 automatic alignment is being performed.
S-US G ADJ SRT : C14 automatic alignment is being performed.
T-US G ADJ SRT : C15 automatic alignment is being performed.
AUTO US ADJ FIN : C11 automatic alignment is completed.

Error messages are displayed when a problem is detected dur-ing adjustments. Each adjustment then stops.

- "S-US IMP ERROR" : The supply USG resonance cannot be found or supply USG is disconnected.
- "S-US EXT IMP MAX" : High impedance outside supply USG resonance point.
- "S-US PHS MIN" : Maximum phase change near supply USG resonance is too small.

- "T-US IMP ERROR" : The take-up USG resonance cannot be found or take-up USG is disconnected.
- "T-US EXT IMP MAX" : High impedance outside take-up USG resonance point.
- "T-US PHS MIN" : Maximum phase change near take-up USG resonance is too small.

- "S-US UNLOCK" : High harmonic distortion of the supply USG or low impedance of the resonance point.

- "T-US UNLOCK" : High harmonic distortion of the take-up USG or low impedance of the resonance point.

B : 0101 : C11 automatic alignment is in the standby state.
0202 : C12 automatic alignment is being performed.
0303 : C13 automatic alignment is being performed.
Others : See the C14 and C15 items.

C : See the C12, C13, C14, and C15 items.

D : See the C12, C13, C14, and C15 items.

UC C12 : S-US OFFSET ADJUSTMENT

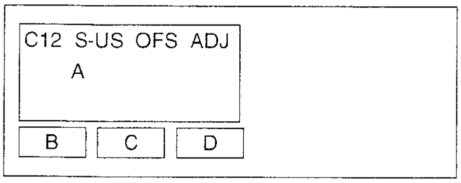
Outline

The pre-alignment voltage of the supply USG is automatically adjusted in this test mode.
To activate the supply USG, a VCO input voltage must be aligned so that it corresponds to the detected resonance frequency.
The VCO input voltage is determined by the sum of pre-alignment and fine-alignment voltages. In this test mode, the pre-alignment voltage is aligned with the fine-alignment voltage kept constant.
The pre-alignment voltage value does not change unless it is realigned.

Key Operation

[>] (f2) ON : Starts the automatic adjustment.

Control Panel Display



A : The message below is displayed.
S-US OFS AJ SRT : C12 automatic alignment is being performed.
S-US OFS AJ FIN : C12 automatic alignment is completed.

Error messages are displayed when abnormality is detected during adjustment. Adjustment then stops.

- "S-US IMP ERROR" : The supply USG resonance cannot be found or supply USG is disconnected.
- "S-US EXT IMP MAX" : High impedance outside supply USG resonance point.
- "S-US PHS MIN" : Maximum phase change near supply USG resonance is too small.

For countermeasures, refer to Section 3-6-8. Countermeasures for Error Messages.

B : 0202 : C12 is in the selection state.

C : Pre-alignment voltage value of the supply USG.

D : Pre-alignment voltage value for the supply USG resonance.

UC C13 : T-US OFFSET ADJUSTMENT

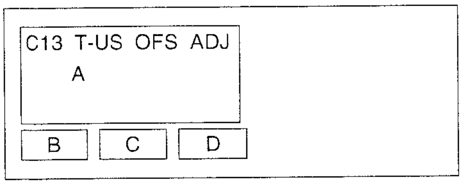
Outline

The pre-alignment voltage of the take-up USG is automatically adjusted in this test mode.
To activate the take-up USG, a VCO input voltage must be aligned so that it corresponds to the detected resonance frequency.
The VCO input voltage is determined by the sum of pre-alignment and fine-alignment voltages. In this test mode, the pre-alignment voltage is aligned with the fine-alignment voltage kept constant.
The pre-alignment voltage value does not change unless it is realigned.

Key Operation

[>] (f2) ON : Starts the automatic adjustment.

Control Panel Display



A : The message below is displayed.

T-US OFS AJ SRT	: C13 automatic alignment is being performed.
T-US OFS AJ FIN	: C13 automatic alignment is completed.

Error messages are displayed when a problem is detected during adjustment. Adjustment then stops.

• "T-US IMP ERROR"	: The take-up USG resonance cannot be found or take-up USG is disconnected.
• "T-US EXT IMP MAX"	: High impedance outside take-up USG resonance point.
• "T-US PHS MIN"	: Maximum phase change near resonance is too small.

For countermeasures, refer to Section 3-6-8. Countermeasures for Error Messages.

B : 0303 : C13 is in the selection state.

C : Pre-alignment voltage value of the take-up USG.

D : Pre-alignment voltage value for the take-up USG resonance.

UC C14 : S-US GAIN ADJUSTMENT

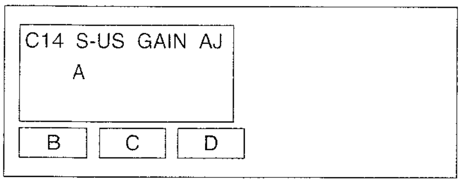
Outline

The driving output of the supply USG is automatically aligned in this test mode.
The output value is aligned so that the supply USG is driven in 100 mW, 200 mW, 400 mW, 600 mW, 800 mW, and 1000 mW.

Key Operation

> (f2) ON : Starts the automatic aligned.

Control Panel Display



A : The massage below is displayed.
S-US G ADJ SRT : C14 automatic adjustment is being performed.
S-US G ADJ FIN : C14 automatic adjustment is completed.

An error message is displayed when a problem is detected during adjustment. Adjustment then stops.

- "S-US UNLOCK" : High harmonic distortion of the supply USG or low impedance of the resonance point.

For countermeasures, refer to Section 3-6-8. Countermeasures for Error Messages.

B : Displays the output adjustment data when the supply USG is driven in 1000 mW as hexadecimal data in high-order 2 bytes, and the output adjustment data when it is driven in 800 mW as hexadecimal data in low-order 2 bytes.

C : Displays the output adjustment data when the supply USG is driven in 600 mW as hexadecimal data in high-order 2 bytes, and the output adjustment data when it is driven in 400 mW as hexadecimal data in low-order 2 bytes.

D : Displays the output adjustment data when the supply USG is driven in 200 mW as hexadecimal data in high-order 2 bytes, and the output adjustment data when it is driven in 100 mW as hexadecimal data in low-order 2 bytes.

UC C15 : T-US GAIN ADJUSTMENT

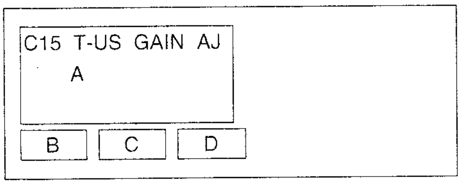
Outline

The driving output of the take-up USG is automatically aligned in this test mode.
The output value is aligned so that the take-up USG is driven in 100 mW, 200 mW, 400 mW, 600 mW, 800 mW, and 1000 mW.

Key Operation

`>` (f2) ON : Starts the automatic adjustment.

Control Panel Display



A : The messabe below is displayed.
T-US G ADJ SRT : C15 automatic alignment is being performed.
T-US G ADJ FIN : C15 automatic alignment is completed.

An error message is displayed when a problem is detected during adjustment. Adjustment then stops.

- "T-US UNLOCK" : High harmonic distortion of the take-up USG or low impedance of the resonance point.

For countermeasures, refer to Section 3-6-8. Countermeasures for Error Messages.

B : Displays the output adjustment data when the take-up USG is driven in 1000 mW as hexadecimal data in high-order 2 bytes, and the output adjustment data when it is driven in 800 mW as hexadecimal data in low-order 2 bytes.

C : Displays the output adjustment data when the take-up USG is driven in 600 mW as hexadecimal data in high-order 2 bytes, and the output adjustment data when it is driven in 400 mW as hexadecimal data in low-order 2 bytes.

D : Displays the output adjustment data when the take-up USG is driven in 200 mW as hexadecimal data in high-order 2 bytes, and the output adjustment data when it is driven in 100 mW as hexadecimal data in low-order 2 bytes.

UC D11 : AUTO US CHK

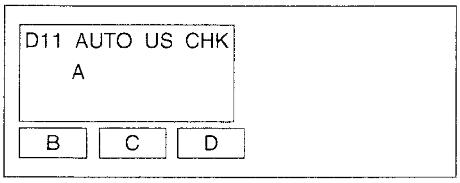
Outline

The supply and take-up USGs' self-diagnosis can be performed in this test mode.
The "D12" and "D13" self-diagnosis is performed continuous-ly.

Key Operation

[>]   (f2) ON : Starts the self diagnosis.

Control Panel Display



A : The message below is displayed.
S-US CHECK SRT : D12 self-diagnosis is being performed.
T-US CHECK SRT : D13 self-diagnosis is being performed.
AUTO US CHK FIN : D11 self-diagnosis is completed.

Error messages are displayed when a problem is detected during adjustments. Each adjustment then stops

- "S-US IMP ERROR" : The supply USG resonance cannot be found or supply USG is disconnected.
- "S-US EXT IMP MAX" : High impedance outside the supply USG resonance point.
- "S-US PHS MIN" : Maximum phase change near resonance is too small.
- "S-US DIST MAX" : High harmonic distortion of the supply USG.
- "S-US IMP MIN" : Low resonance point's impedance of the supply USG.

- "T-US IMP ERROR" : The take-up USG resonance cannot be found or the take-up USG is disconnected.
- "T-US EXT IMP MAX" : High impedance outside take-up USG resonance point.
- "T-US PHS MIN" : Maximum phase change near resonance is too small.
- "T-US DIST MAX" : High harmonic distortion of the take-up USG.
- "T-US IMP MIN" : Low resonance point's impedance of the take-up USG.

For countermeasures, refer to Section 3-6-8. Countermeasures for Error Messages.

B : 0101 : D11 self-diagnosis is in the standby state.
0202 : D12 self-diagnosis is being performed.
0303 : D13 self-diagnosis is being performed.

C : Pre-alignment voltage values of the supply and take-up USG.

D : Pre-alignment voltage values for the resonance points of the supply and take-up USG.

UC D12 : S-USG CHECK

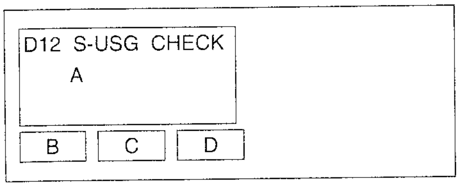
Outline

The self-diagnosis of the supply USG is performed in this test mode.
D12 diagnoses that the supply USG is in the normal operating state or in the deterioration state. An error message is displayed when a problem.

Key Operation

[>] (f2) ON : Starts the self-diagnosis.

Control Panel Display



A : The message below is displayed.
S-USG CHECK SRT : D12 self-diagnosis is being performed.
S-USG CHECK FIN : D12 self-diagnosis is completed.

Error messages are displayed when a problem is detected during adjustment. Adjustment then stops.

- "S-US IMP ERROR" : The supply USG resonance cannot be found or the supply USG is disconnected.
- "S-US EXT IMP MAX" : High impedance outside supply USG resonance point.
- "S-US PHS MIN" : Maximum phase change near resonance is tool small.
- "S-US DIST MAX" : High harmonic distortion of the supply USG.
- "S-US IMP MIN" : Low resonance point's impedance of the supply USG.

For countermeasures, refer to Section 3-6-8. Countermeasures for Error Messages.

B : 0202 : D12 is in the selection state.

C : Pre-alignment voltage value of the supply USG.

D : Pre-alignment voltage value for the supply USG resonance point.

UC D13 : T-USG CHECK

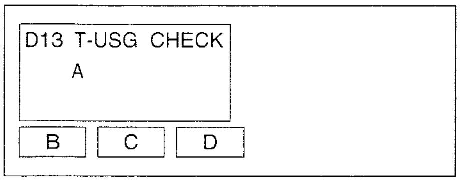
Outline

The self-diagnosis of the take-up USG is performed in this test mode.
D13 diagnoses that the take-up USG is in the normal operating state or in the deterioration state. An error message is displayed when a problem.

Key Operation

[>] (f2) ON : Starts the self-diagnosis.

Control Panel Display



A : The message below is displayed.
T-USG CHECK SRT : D13 self-diagnosis is being performed.
T-USG CHECK FIN : D13 self-diagnosis is completed.

Error messages are displayed when a problem during adjust-ment. Adjustment then stops.

- "T-US IMP ERROR" : The take-up USG resonance cannot be found or the take-up USG is disconnected.
- "T-US EXT IMP MAX" : High impedance outside take-up USG resonance point.
- "T-US PHS MIN" : Maximum phase change near resonance is too small.
- "T-US DIST MAX" : High harmonic distortion of the take-up USG.
- "T-US IMP MIN" : Low resonance point's impedance of the take-up USG.

For countermeasures, refer to Section 3-6-8. Countermeasures for Error Messages.

B : 0303: D13 is in the selection state.

C : Pre-alignment voltage value of the take-up USG.

D : Pre-alignment voltage value for the take-up USG resonance point.

3-6-7. CHECKER MENU FROWCHART

CHECKER

- SP Mode
  - $,$$ MEMORY READ/WRITE
  - =0 SP,SY,SV,DT RESET
  - NVW NOVRAM WRITE
  - Mode E
    - E20 TEST MODE OFF
    - E21 REEL SHIFT SENSOR READ
    - E22 CASSETTE COMPERTMENT SENSOR READ
    - E23 CASSETTE COMPERTMENT SENSOR READ
    - E24 CASSETTE COMPERTMENT SENSOR READ
    - E25 THREAD SENSOR READ
    - E2C CORDING HOLE SENSOR READ
  - Mode F
    - F20 TEST MODE OFF
    - F21 REEL SHIFT TEST
    - F22 CASSETTE COMPERTMENT ALL TEST
    - F23 CASSETTE COMPERTMENT INNER TEST
    - F24 CASSETTE COMPERTMENT OUTER TEST
    - F25 THREAD TEST
    - F26 MAIN PINCH TEST
    - F27 SUB PINCH TEST
    - F28 HEAD CLEANER TEST
    - F29 TAPE CLEANER TEST
    - F2A DRUM TEST
    - F30 TEST MODE OFF
    - F31 REEL SHIFT TEST
    - F32 CASSETTE COMPERTMENT ALL DRIVER TEST
    - F33 CASSETTE COMPERTMENT INNER DRIVER TEST
    - F34 CASSETTE COMPERTMENT OUTER DRIVER TEST
    - F35 THREAD DRIVER TEST
    - F36 MAIN PINCH DRIVER TEST
    - F37 SUB PINCH DRIVER TEST
    - F38 HEAD CLEANER DRIVER TEST
    - F39 TAPE CLEANER DRIVER TEST
    - F3A DRUM DRIVER TEST
- SV Mode
  - $,$$ MEMORY READ/WRITE
  - =0 SP,SY,SV,DT RESET
  - Mode B
    - B0 TEST MODE OFF
    - B12 ACCEL SELECT
    - B15 DRUM PG ADJUST
    - B21 DT NORMAL/FIX SELECT
    - B22 CTL POSITION ALIGNMENT
  - Mode C
    - C0 TEST MODE OFF
    - C11 AUTO SERVO ADJUST
    - C12 CAPSTAN FG OFFSET ADJUST
    - C14 S-REEL FG OFFSET ADJUST
    - C15 TAPE END SENSOR GAIN ADJUST
    - C16 TAPE TOP SENSOR GAIN ADJUST
    - C17 TAPE SAG SENSOR GAIN ADJUST
    - C18 T-REEL TORQUE ADJUST
    - C19 S-REEL TORQUE ADJUST
    - C1A CAPSTAN NORMAL VELOCITY ADJUST
    - C1B CAPSTAN FORMAT VELOCITY ADJUST
    - C1C CAPSTAN FG GAIN ADJUST
    - C1D DRUM PG POLARITY ADJUST
    - C1E DRUM VOLOCITY ADJUST
    - C28 S-TENSION OFFSET ADJUST
    - C29 S-TENSION GAIN ADJUST
    - C2A T-TENSION OFFSET ADJUST
    - C2B T-TENSION GAIN ADJUST
  - Mode D
    - D0 TEST MODE OFF
    - D11 AUTO SERVO CHECK
    - D12 CAPSTAN FG OFFSET CHECK
    - D13 T-REEL FG OFFSET CHECK
    - D14 S-REEL FG OFFSET CHECK
    - D15 TAPE END SENSOR GAIN CHECK
    - D16 TAPE TOP SENSOR GAIN CHECK
    - D17 TAPE SAG SENSOR GAIN CHECK
    - D18 T-REEL TORQUE CHECK
    - D19 S-REEL TORQUE CHECK
    - D1A CAPSTAN MOTOR CHECK
    - D1B CAPSTAN NORMAL VELOCITY CHECK
    - D1C CAPSTAN FORMAT VELOCITY CHECK
    - D1D CAPSTAN FG GAIN CHECK
    - D1E T-REEL BRAKE CHECK
    - D1F S-REEL BRAKE CHECK
    - D21 T-REEL TENSION CHECK
    - D22 S-REEL TENSION CHECK
    - D23 DRUM LOCK CHECK
    - D24 DRUM PG/FG POLARITY CHECK
    - D25 DRUM VELOCITY CHECK
    - D26 DRUM PG JITTER CHECK
    - D27 THREAD CHECK
    - D28 CASSETTE COMPERTMENT CHECK
    - D29 REEL SHIFT CHECK
    - D2A SENSOR CHECK
    - D2F DRUM WAVEFORM CHECK
- UC Mode
  - $,$$ MEMORY READ/WRITE
  - =0 UC RESET
  - Mode C
    - C0 TEST MODE OFF
    - C11 AUTO US ADJUST
    - C12 S-US OFFSET ADJUST
    - C13 T-US OFFSET ADJUST
    - C14 S-US GAIN ADJUST
    - C15 T-US GAIN ADJUST
  - Mode D
    - D0 TEST MODE OFF
    - D11 AUTO US CHECK
    - D12 S-USG CHECK
    - D13 T-USG CHECK

3-6-8. Countermeasures for Error Messages

Error Message	Command Executed	Error Content and Countermeasure
C SIZE NG	SP F22 F24	Detection error of cassette size is occurring. Countermeasure : • Insert cassette correctly, or remove cassette.
DT NOT FIX MODE GO TO B21	SV B15 B22	DT Head is not the mount height fixed state. Countermeasure : • Execute command of [SV B21 DT NORMAL/FIX SELECT], and select the fixed-state mode.
ERROR!! CAP FG LEVEL	SV C1C	Incorrect amplitude of capstan motor FG is detected. Countermeasure : • Execute command of [SV C12 CAPSTAN FG OFFSET ADJUST].
	SV D1D	Incorrect amplitude of capstan motor FG is detected. Countermeasure : • Execute commands of [SV C12 CAPSTAN FG OFFSET ADJUST] and [SV C1C CAPSTAN FG GAIN ADJUST]
ERROR!! CAPSTAN FG	SV C12	Cannot detect capstan FG. Countermeasure : 1. Confirm that the following circuit boards are correctly in serted in their home slots. DVR-20: MD-50, SV-133 DVR-28: MD-62, SSP-07 2. Confirm the correct wiring of capstan motor. 3. Check the following fuses of +14 V power line. DVR-20: F3 (FU-41 board), DVR-28: F2 (FU-53 board)
	SV D12	Cannot detect capstan FG. or detected incorrect duty ratio. Countermeasure : • Execute [SV C12 CAPSTAN FG OFFSET ADJUST] command.

Error Message	Command Executed	Error Content and Countermeasure
ERROR!! CAPSTAN MOTOR	SV C1A	Cannot rotate capstan motor in the rated record mode speed. Countermeasure : • Execute [SV C12 CAPSTAN FG OFFSET ADJUST] command.
	SV C1B	Cannot rotate capstan motor in the rated fast format speed. Countermeasure : • Execute [SV C12 CAPSTAN FG OFFSET ADJUST] command.
	SV C1C	Cannot rotate capstan motor in the rated speed. Countermeasure : • Execute [SV C12 CAPSTAN FG OFFSET ADJUST] command.
	SV D1A	Incorrect capstan speed is detected when driven with 3.5V. Countermeasure : • Execute [SV C12 CAPSTAN FG OFFSET ADJUST] command.
	SV D1B	Cannot rotate capstan motor in the rated record mode speed. Countermeasure : • Execute [SV C12 CAPSTAN FG OFFSET ADJUST] command.
	SV D1C	Cannot rotate capstan motor in the rated fast format speed. Countermeasure : • Execute [SV C12 CAPSTAN FG OFFSET ADJUST] command.
ERROR!! CASSECON MOTOR	SV D28	Lift-up / down of cassette compartment does not complete within the rated period of time. Or, cassette compartment up / down-hold is not correctly done. Countermeasure : 1. Confirm that the following printed circuit boards are correctly inserted into their home slots. DVR-20 : MD-50, SP-15, SV-133 DVR-28 : MD-62, SSP-07 2. Confirm connection of cassette compartment motor. 3. Confirm that cassette compartment sensor has no problem. 4. Confirm that the following fuses in 14V power supply system are good. DVR-20 : F3 (FU-41 board), DVR-28 : F2 (FU-53 board).

Error Message	Command Executed	Error Content and Countermeasure
ERROR!! CCM UP SENSOR	SV D27 D28 D29 D2A	Detected trouble in the light-block / pass operation of the cassette compartment up sensor. Countermeasure : • Confirm that the following printed circuit boards are correctly inserted into their home slots. DVR-20 : SE-72, SP-15 DVR-28 : SE-122, SE-123, SE-135, SSP-07
ERROR!! CENTER SENSOR	SV C17	Cannot adjust the center sensor output to 2.4V ± 0.1V. Countermeasure : • Confirm that the following printed circuit boards are correctly inserted into their home slots. DVR-20 : PC-65, SV-133 DVR-28 : PC-65, SSP-07
	SV D17	Detected trouble in the center sensor output. Countermeasure : • Execute [SV C17 TAPE SAG SENSOR GAIN ADJUST] command.
ERROR!! CORD HOLE 1 (2, 3 or 4) SNR	SV D27 D28 D29 D2A	Detected trouble in the light-block / pass operation of the cassette coding sensor 1 (2, 3, or 4). Countermeasure : • Confirm that the following printed circuit boards are correctly inserted into their home slots. DVR-20 : SE-72, SP-15 DVR-28 : SE-122, SE-123, SE-135, SSP-07
ERROR!! CP FFOR VELO	SV C1B	Even after adjustment for 20 seconds, the output from the speed error measurement block cannot be made minimum. Countermeasure : • Execute [SV C12 CAPSTAN FG OFFSET ADJUST] command.
	SV D1C	Detected trouble in the output of the speed error measurement block. Countermeasure : • Execute [SV C12 CAPSTAN FG OFFSET ADJUST] and [SV C1B CAPSTAN FORMAT VELOCITY ADJUST] commands.

Error Message	Command Executed	Error Content and Countermeasure
ERROR!! CP FVL UNSTBL	SV C1B	Fluctuation in the capstan motor drive voltage is too big. Countermeasure : • Execute [SV C12 CAPSTAN FG OFFSET ADJUST] command.
	SV D1C	Fluctuation in the capstan motor drive voltage is too big. Countermeasure : • Execute [SV C12 CAPSTAN FG OFFSET ADJUST] and [SV C1B CAPSTAN FORMAT VELOCITY ADJUST] commands.
ERROR!! CP NORM VELO	SV C1A	Even after adjustment for 20 seconds, the output from the speed error measurement block cannot be made minimum. Countermeasure : • Execute [SV C12 CAPSTAN FG OFFSET ADJUST] command.
	SV D1B	Detected trouble in the output of the speed error measurement block. Countermeasure : • Execute [SV C12 CAPSTAN FG OFFSET ADJUST] and [SV C1A CAPSTAN NORMAL VELOCITY ADJUST] commands.
ERROR!! CP NVL UNSTBL	SV C1A	Fluctuation in the capstan motor drive voltage is too big. Countermeasure : • Execute [SV C12 CAPSTAN FG OFFSET ADJUST] command.
	SV D1B	Fluctuation in the capstan motor drive voltage is too big. Countermeasure : • Execute [SV C12 CAPSTAN FG OFFSET ADJUST] and [SV C1A CAPSTAN NORMAL VELOCITY ADJUST] commands.

Error Message	Command Executed	Error Content and Countermeasure
ERROR!! CST DOWN SNR	SV D27 D28 D29 D2A	Detected trouble in the light-block / pass operation of the cassette compartment down sensor. Countermeasure : • Confirm that the following printed circuit boards are correctly inserted into their home slots. DVR-20 : SE-72, SP-15 DVR-28 : SE-122, SE-123, SE-135, SSP-07
ERROR!! CST IN SENSOR	SV D27 D28 D29 D2A	Detected trouble in the light-block / pass operation of the cassette compartment in sensor. Countermeasure : • Confirm that the following printed circuit boards are correctly inserted into their home slots. DVR-20 : SE-72, SP-15 DVR-28 : SE-122, SE-123, SE-135, SSP-07
ERROR!! CST SIZE SNR	SV D27 D28 D29 D2A	Detected trouble in the light-block/pass operation of the cassette compartment size sensor. Countermeasure : • Confirm that the following printed circuit boards are correctly inserted into their home slots. DVR-20 : SE-72, SP-15 DVR-28 : SE-122, SE-123, SE-135, SSP-07
ERROR!! DR PG POLARITY	SV D24	Cannot rotate drum motor in the rated speed. And as the result of PG polarity measurement, it does not coincide with the adjustment data. Countermeasure : • Execute [SV C1D DRUM PG POLARITY ADJUST] command.
ERROR!! DRUM LOCK TIME	SV D23	Cannot rotate drum motor in the rated speed. Or, detected trouble in rise-up time and fall-down time of dthe drum motor. Countermeasure : • Execute [SV C1E DRUM VELOCITY ADJUST] command.

Error Message	Command Executed	Error Content and Countermeasure
ERROR!! DRUM MOTOR	SV C1D	During PG polarity adjustment, drum motor cannot rotate in the rated speed. Countermeasure : 1. Confirm that the following printed circuit boards are correctly inserted into their home slots. DVR-20 : MD-50, SP-15, SV-133 DVR-28 : MD-62, SSP-07 2. Confirm connection of drum motor. 3. Confirm that the following fuses in 40V power supply system are good. DVR-20 : F2 (FU-41 board), DVR-28 : F3 (FU-53 board).
	SV C1E	During speed adjustment, drum motor cannot rotate up to 95 % of its rated speed. Or, error voltage after completion of adjustment is too big. Countermeasure : 1. Confirm that the following printed circuit boards are correctly inserted into their home slots. DVR-20 : MD-50, SP-15, SV-133 DVR-28 : MD-62, SSP-07 2. Confirm connection of drum motor. 3. Confirm that the following fuses in 40V power supply system are good. DVR-20 : F2 (FU-41 board), DVR-28 : F3 (FU-53 board).
ERROR!! DRUM PG JITTER	SV D26	Cannot rotate drum motor in the rated speed. And detected trouble in the maximum value of PG jitter measurement. Countermeasure : • Execute [SV C1D DRUM PG POLARITY ADJUST] and [SV C1E DRUM VELOCITY ADJUST] commands.
ERROR!! DRUM VELOCITY	SV D25	Could not rotate the drum motor in the rated speed. Or, detected trouble in the measured error voltage. Countermeasure : • Execute [SV C1E DRUM VELOCITY ADJUST] command.

Error Message	Command Executed	Error Content and Countermeasure
ERROR!! END SENSOR	SV C15	Cannot adjust the end sensor output to 2.4V ± 0.1V. Countermeasure : • Confirm that the following printed circuit boards and connectors are correctly inserted into their home slots. DVR-20 : PC-63, SV-133 DVR-28 : PC-63, SSP-07
	SV D15	Detected incorrect condition in the end sensor output. Countermeasure : • Execute [SV C15 TAPE END SENSOR GAIN ADJUST] command.
ERROR!! M SIZE SENSOR	SV D27 D28 D29 D2A	Detected trouble in the light-block / pass operation of the M side reel shift sensor. Countermeasure : • Confirm that the following printed circuit boards and conncectors are correctly inserted into their home slots. DVR-20 : SE-72, SP-15 DVR-28 : SE-122, SE-123, SE-135, SSP-07
ERROR!! REC INH SENSOR	SV D27 D28 D29 D2A	Detected trouble in the light-block / pass operation of the cassette coding sensor. Countermeasure • Confirm that the following printed circuit boards and conncectors are correctly inserted into their home slots. DVR-20 : SE-72, SP-15 DVR-28 : SE-122, SE-123, SE-135, SSP-07
ERROR!! SHIFT MOTOR	SV D29	Reel shift operation does not complete within the rated period of time. Or, reel shift hold is not correctly done. Countermeasure : 1. Confirm that the following printed circuit boards are correctly inserted into their home slots. DVR-20 : MD-50, SP-15, SV-133 DVR-28 : MD-62, SSP-07 2. Confirm connection of reel shift motor. 3. Confirm that reel shift sensor and reel shift position meter have no problem. 4. Confirm that the following fuses in 14V power supply system are good. DVR-20 : F3(FU-41 board), DVR-28 : F2(FU-53 board).

Error Message	Command Executed	Error Content and Countermeasure
ERROR!! S-REEL BRAKE	SV D1F	Detected incorrect condition in brake power. Countermeasure : 1. Execute [SV D14 S-REEL FG OFFSET CHECK] and [SV D19 S-REEL TORQUE CHECK] commands. 2. When the above commands could be completed successfully, make the following adjustments. DVR-20 : Replace brake shoe. DVR-28 : Select proper position of brake spring hook position. If adjustment cannot be done, replace brake shoe.
ERROR!! S-REEL FG	SV C14	Cannot detect the S Reel FG. Countermeasure : 1. Confirm that the following printed circuit boards are correctly inserted into their home slots. DVR-20 : MD-50, SV-133 DVR-28 : MD-62, SSP-07 2. Confirm connection of S Reel motor. 3. Confirm that the following fuses in 40V power supply system are good. DVR-20 : F2 (FU-41 board), DVR-28 : F3 (FU-53 board).
	SV D14	Cannot detect the S Reel FG. Or, detected incorrect condition in duty ratio. Countermeasure : • Execute [SV C14 S-REEL FG OFFSET ADJUST] command. Detected incorrect condition in the tension data.
ERROR!! S-REEL TENSITON	SV D22	Countermeasure : 1. Confirm that the following printed circuit boards and connectors are correctly inserted into their home slots. DVR-20 : DET-19, SV-133 DVR-28 : DET-19, SSP-07 2. Make adjustment of S side Tension Regulator.

Error Message	Command Executed	Error Content and Countermeasure
ERROR!! S-REEL TORQUE	SV C19	Cannot execute the S Reel Torque adjustment. Countermeasure : 1. Confirm that the following printed circuit boards are correctly inserted into their home slots. DVR-20 : MD-50, SV-133 DVR-28 : MD-62, SSP-07 2. Confirm connection of S Reel motor. 3. Confirm that the following fuses in 40V power supply system are good. DVR-20 : F2 (FU-41 board), DVR-28 : F3 (FU-53 board).
	SV D19	Result of measurement varies too much. Or, correction value is too far from appropriate value. Countermeasure : • Execute [SV C19 S-REEL TORQUE ADJUST] command.
ERROR!! S SIZE SENSOR	SV D27 D28 D29 D2A	Detected trouble in the light-block / pass operation of the S side Reel Shift Sensor. Countermeasure : • Confirm that the following printed circuit boards are correctly inserted into their home slots. DVR-20: SE-72, SP-15 DVR-28: SE-122, SE-123, SE-135, SSP-07
ERROR!! THREAD MOTOR	SV D27	Threading / unthreading of tape cassette does not complete within the rated period of time. Or, thread-hold / unthread-hold is not correctly done. Countermeasure : 1. Confirm that the following printed circuit boards are correctly inserted into their home slots. DVR-20 : MD-50, SP-15, SV-133 DVR-28 : MD-62, SSP-07 2. Confirm connection of threading motor. 3. Confirm that threading position meter has no problem. 4. Confirm that the following fuses in 14V power supply system are good. DVR-20 : F3 (FU-41 board), DVR-28 : F2 (FU-53 board).
ERROR!! TOP SENSOR	SV C16	Cannot adjust the top sensor output to 2.4V ± 0.1V. Countermeasure : • Confirm that the following printed circuit boards and connectors are correctly inserted into their home slots. DVR-20 : PC-63, SV-133 DVR-28 : PC-63, SSP-07
	SV D16	Detected incorrect condition in the top sensor output. Countermeasure : • Execute [SV C16 TAPE TOP SENSOR GAIN ADJUST] command.

Error Message	Command Executed	Error Content and Countermeasure
ERROR!! T-REEL BRAKE	SV D1E	Detected incorrect condition in brake power. Countermeasure : 1. Execute [SV D13 T-REEL FG OFFSET CHECK] and [SV D18 T-REEL TORQUE CHECK] commands. 2. When the above commands could be completed successfully, make the following adjustments. DVR-20 : Replace brake shoe. DVR-28 : Select proper position of brake spring hook position. If adjustment cannot be done, replace brake shoe.
ERROR!! T-REEL FG	SV C13	Cannot detect the T Reel FG. Countermeasure : 1. Confirm that the following printed circuit boards are correctly inserted into their home slots. DVR-20 : MD-50, SV-133 DVR-28 : MD-62, SSP-07 2. Confirm connection of T Reel motor. 3. Confirm that the T Reel Brake has no problem. 4. Confirm that the following fuses in 40V power supply system are good. DVR-20 : F2 (FU-41 board), DVR-28 : F3 (FU-53 board).
	SV D13	Cannot detect the T Reel FG. Or, detected incorrect condition in duty ratio. Countermeasure : • Execute [SV C13 T-REEL FG OFFSET ADJUST] command.
ERROR!! T-REEL TENSION	SV D21	Detected incorrect condition in the tension data. Countermeasure : 1. Confirm that the following printed circuit boards and connectors are correctly inserted into their home slots. DVR-20 : DET-18, SV-133 DVR-28 : DET-18, SSP-07 2. Make adjustment of T side Tension Regulator.

Error Message	Command Executed	Error Content and Countermeasure
ERROR!! T-REEL TORQUE	SV C18	Cannot execute the T Reel Torque adjustment. Countermeasure : 1. Confirm that the following printed circuit boards are correctly inserted into their home slots. DVR-20 : MD-50, SV-133 DVR-28 : MD-62, SSP-07 2. Confirm connection of T Reel motor. 3. Confirm that the T Reel Brake has no problem. 4. Confirm that the following fuses in 40V power supply system are good. DVR-20 : F2 (FU-41 board), DVR-28 : F3 (FU-53 board).
	SV D18	Result of measurement varies too much. Or, correction value is too far from appropriate value. Countermeasure : • Execute [SV C18 T-REEL TORQUE ADJUST] command.
ERROR!! USR (CNR M) SNR	SV D27 D28 D29 D2A	Detected trouble in the light-block / pass operation of the M side User Center Sensor. Countermeasure : • Confirm that the following printed circuit boards are correctly inserted into their home slots. DVR-20 : SE-72, SP-15 DVR-28 : SE-122, SE-123, SE-135, SSP-07
ERROR!! USR (CNR S) SNR	SV D27 D28 D29 D2A	Detected trouble in the light-block / pass operation of the S side User Center Sensor. Countermeasure : • Confirm that the following printed circuit boards are correctly inserted into their home slots. DVR-20 : SE-72, SP-15 DVR-28 : SE-122, SE-123, SE-135, SSP-07
ERROR!! USR (S SIDE) SNR	SV D27 D28 D29 D2A	Detected trouble in the light-block / pass operation of the S side User Sensor. Countermeasure : • Confirm that the following printed circuit boards are correctly inserted into their home slots. DVR-20 : SE-72, SP-15 DVR-28 : SE-122, SE-123, SE-135, SSP-07
ERROR!! USR (T SIDE) SNR	SV D27 D28 D29 D2A	Detected trouble in the light-block / pass operation of the T side User Sensor. Countermeasure : • Confirm that the following printed circuit boards are correctly inserted into their home slots. DVR-20 : SE-72, SP-15 DVR-28 : SE-122, SE-123, SE-135, SSP-07

Error Message	Command Executed	Error Content and Countermeasure
NOT CAS UP	SP F21 F25	Cassette compartment does not lift up. Countermeasure : • Execute [SP F22 CASSETTE COMPARTMENT ALL TEST] command.
NOT EJECT	SP F21 F22 F23 F24 F25 F26 F27 F29 F2A	VTR is not in the eject mode. Countermeasure : • Put the equipment into eject mode.
NOT IN DWN	SP F24	Inner compartment does not move down. Countermeasure : • Execute [SP F23 CASSETTE COMPARTMENT INNER TEST] command to move down the inner cassette compartment.
NOT OUT UP	SP F23	Outer compartment does not move up. Countermeasure : • Execute [SP F24 CASSETTE COMPARTMENT OUTER TEST] command to move up the outer cassette compartment.
NOT PIN OFF	SP F25	Pinch Roller does not turn OFF. Countermeasure : • Execute [SP F26 MAIN PINCH TEST] command to set the Pinch Roller OFF.
NOT R POS L NOT R POS M NOT R POS S	SP F22 F24	Reel position does not match the cassette size. Countermeasure : 1. Execute [SP F21 REEL SHIFT TEST] command to set the Reel Shift position. 2. Remove cassette.
NOT UNTHER	SP F22 F24	Threading Arm is not in the unthreaded position. Countermeasure : • Execute [SP F25 THREAD TEST] command to establish the unthread ed end condition.

Error Message	Command Executed	Error Content and Countermeasure
S-US DIST MAX	UC D11 D12	Harmonic distortion is too much in S side USG. Countermeasure : • Replace by exchanging the connectors CN821 and CN822 on UC-2 board, and try to execute command. If the same error message appears, replace the S side USG.
S-US EXT IMP MAX	UC C11 C12 D11 D12	Impedance outside resonant point in S side USG is too high. Countermeasure : • Replace by exchanging the connectors CN821 and CN822 on UC-2 board, and try to execute command. If the same error message appears, replace the S side USG.
S-US IMP ERROR	UC C11 C12 D11 D12	Resonant point does not exist in S side USG. Or, wire is open. Countermeasure : 1. Confirm connection of S side USG. 2. Confirm that the USG is in the threaded end position. <If the error message appears again, even after the above countermeasure is taken.> • Replace by exchanging the connectors CN821 and CN822 on UC-2 board, and try to execute command. If the same error message appears, replace the S side USG.
S-US IMP MIN	UC D11 D12	Resonant point impedance of the S side USG is too low. Countermeasure : • Replace by exchanging the connectors CN821 and CN822 on UC-2 board, and try to execute command. If the same error message appears, replace the S side USG.
S-US PHS MIN	UC C11 C12 D11 D12	The maximum phase change around the resonant point of S side USG is small. Countermeasure : • Replace by exchanging the connectors CN821 and CN822 on UC-2 board, and try to execute command. If the same error message appears, replace the S side USG.

Error Message	Command Executed	Error Content and Countermeasure
S-US UNLOCK	UC C11 C14	Harmonic distortion of S side USG is too big. Or, resonant point impedance is low. Countermeasure : • Confirm that UC-2 board has not trouble. • Replace by exchanging the connectors CN821 and CN822 on UC-2 board, and try to execute command. If the same error message appears, replace the S side USG.
THR POS NG	SP F26 F27	Threading Arm is not in the threaded end or in the unthreaded end position. Countermeasure : • Execute [SP F25 THREAD TEST] command to establish the unthreaded end or threaded end condition.
T-US DIST MAX	UC D11 D13	Harmonic distortion is too much in T side USG. Countermeasure : • Replace by exchanging the connectors CN821 and CN822 on UC-2 board, and try to execute command. If the same error message appears, replace the T side USG.
T-US EXT IMP MAX	UC C11 C13 D11 D13	Impedance outside resonant point in T side USG is too high. Countermeasure : • Replace by exchanging the connectors CN821 and CN822 on UC-2 board, and try to execute command. If the same error message appears, replace the T side USG.
T-US IMP ERROR	UC C11 C13 D11 D13	Resonant point does not exist in T side USG. Or, wire is open. Countermeasure : 1. Confirm connection of T side USG. 2. Confirm that the USG is in the threaded end position. <If the error message appears again, even after the above countermeasure is taken.> • Replace by exchanging the connectors CN821 and CN822 on UC-2 board, and try to execute command. If the same error message appears, replace the T side USG.

Error Message	Command Executed	Error Content and Countermeasure
T-US IMP MIN	UC D11 D13	Resonant point impedance of the T side USG is too low. Countermeasure : • Replace by exchanging the connectors CN821 and CN822 on UC-2 board, and try to execute command. If the same error message appears, replace the T side USG.
T-US PHS MIN	UC B11 C11 C13 D11 D13	The maximum phase change around the resonant point of T side USG is small. Countermeasure : • Replace by exchanging the connectors CN821 and CN822 on UC-2 board, and try to execute command. If the same error message appears, replace the T side USG.
T-US UNLOCK	UC C11 C15	Harmonic distortion of T side USG is too big. Or, resonant point impedance is low. Countermeasure : • Confirm that UC-2 board has not trouble. • Replace by exchanging the connectors CN821 and CN822 on UC-2 board, and try to execute command. If the same error message appears, replace the T side USG.

SECTION 3
TEST MENU

FOR BKDV-200/201/202 (The figure is for BKDV-201.)

3-1. OUTLINE

The TEST menu is an important item when maintaining, checking, and repairing the unit.
It can be set in a menu format by the key operation on the control panel.
Press the SHIFT and SET UP keys on the control panel at the same time to display the SYSTEM SCROLL menu.
Next, press the cursor ∨ key or turn the search dial clockwise, while pressing the ENTRY and Center keys on the control panel simultaneously.
The screen shown in Fig. 3-2 is then displayed on the display.

NOTE : The TEST menu is not displayed when the ENTRY and Center keys are not pressed simultaneously.
The menus indicated by ▨ in Table 3-1 are described in this section.

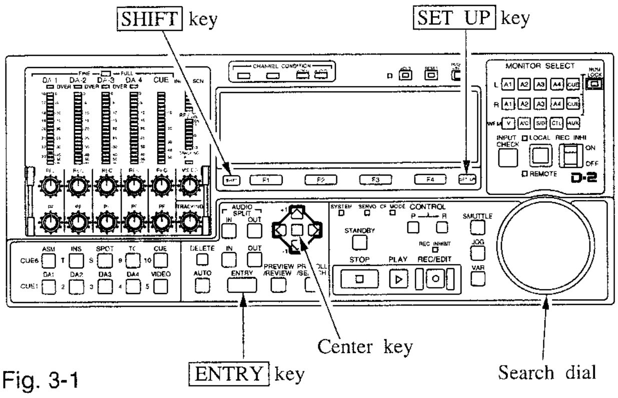
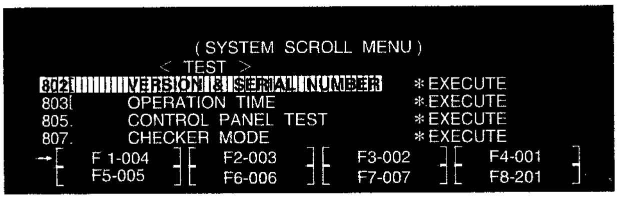


Fig. 3-1



```
            ( SYSTEM  SCROLL  MENU )
        <  TEST  >
802[        VERSION & SERIAL NUMBER        * EXECUTE
803[        OPERATION  TIME                *.EXECUTE
805.        CONTROL  PANEL  TEST           * EXECUTE
807.        CHECKER  MODE                  * EXECUTE
→[   F 1-004   ][   F2-003   ][   F3-002   ][   F4-001   ]
 [   F5-005    ][   F6-006   ][   F7-007   ][   F8-201   ]
```

Fig. 3-2 FL Panel Display

Menu No.	Menu	Description
801		
802	VERSION & SERIAL NUMBER	Refer to BKDV-200/201 Maintenance Manual.
803	OPERATION TIME	Refer to Section 3-2.
804		
805	CONTROL PANEL TEST	Refer to BKDV-200/201 Maintenance Manual.
806		
807	CHECKER MODE	Refer to Section 3-6.
808	PROCESSOR SYSTEM EE TST	Refer to Section 3-4.
809		
810	MULTI-LOOP SOURCE	Refer to Section 3-5.
811	MULTI-LOOP INTERNAL SG	Refer to Section 3-5.
812	MULTI-LOOP LOOP COUNT	Refer to Section 3-5.
813		
814		
815	RF PB ADJUST MODE	Refer to Section 3-3.
816	RF REC ADJUST MODE	Refer to Section 3-3.
817	RF ENVELOPE	Refer to Section 3-3.

Table. 3-1

3-2. OP TIME MENU

The OP (OPERATION) TIME menu displays the operating hour, head drum rotating hour, head working hour, tape traveling hour, and time of cassette threading / unthreading operations. When performing the periodic check of the unit, use this menu to check the total operating hour and the time of cassette threading / unthreading operations.

How to Enter the Menu Mode

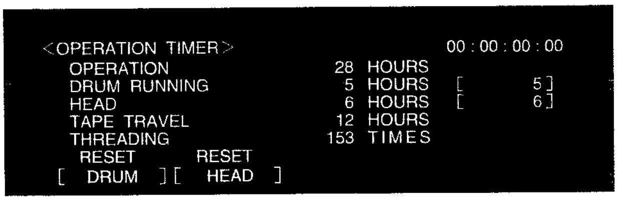
Press the keys on the control panel in the following sequence:

1. Press the SET UP key while pressing the SHIFT key.
2. Press the cursor ∨ key or turn a search dial clockwise, while pressing the ENTRY key with the center key to enter the <TEST> menu.
3. Press the cursor ∨ key or turn the search dial clockwise to move the cursor to 803. [OPERATION TIME].
4. Press the cursor > key to move the cursor to EXECUTE.
5. Press the cursor ∧ key to enter the OPERATION TIME mode.

How to Exit the Menu Mode

Press the SET UP key to return to the control panel's initial screen. Press this key again.
The display can then return to the OP TIME test menu screen (screen in step 3).

Explanation of Display



```
<OPERATION TIMER>                        00 : 00 : 00 : 00
    OPERATION              28  HOURS
    DRUM RUNNING            5  HOURS   [          5]
    HEAD                    6  HOURS   [          6]
    TAPE TRAVEL            12  HOURS
    THREADING             153  TIMES
      RESET        RESET
  [  DRUM   ][   HEAD   ]
```

OPERATION	: Total operating hour is displayed.
DRUM RUNNING	: Drum running hour (The right-hand value shows resettable drum running hour.) **NOTE**
HEAD	: Head working hour (The right-hand value shows resettable head working hour are display.) **NOTE**
TAPE TRAVEL	: Tape traveling hour (calculated in tape length) is displayed.
THREADING	: The time of cassette threading / unthreading operations is displayed. (Cassette threading / unthreading is counted as one operation.)

NOTE : The display shows both total hour and resettable total hour for the drum running hour and head working hour.
Press the F1 key while holding down the ENTRY key to reset the right-hand value of the drum running hour.
Press the F2 key while holding down the ENTRY key to reset the right-hand value of the head working hour.

3-3. RF MENU

This menu is used for checking and adjusting the RF signal system.
Note : The default value is set when shipped from the factory. If the unit is not adjusted correctly in this menu, good-quality video and audio outputs may not be obtained. For details, refer to each section of adjustment.

3-3-1. RF ENVELOPE Menu

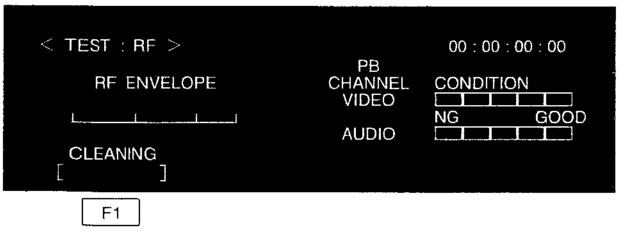
The RF ENVELOPE menu displays the envelope of an RF output.

How to Enter the Menu Mode

1. Press the SET UP key while pressing the SHIFT key.
2. Press the cursor ∨ key or turn a search dial clockwise, while pressing the ENTRY key with the center key to enter the <TEST> menu.
3. Press the cursor ∨ key or turn the search dial clockwise to move the cursor to 817. [RF ENVELOPE].
4. Press the cursor > key to move the cursor to EXECUTE.
5. Press the cursor ∧ key to enter the RF ENVELOPE mode.

How to Exit the Menu Mode

Press the SET UP key to return to the control panel's initial screen. Press this key again.
The display can then return to the RF ENVELOPE test menu screen (screen in step 3).



Explanation of Display

RF ENVELOPE : RF meter
PB CHANNEL CONDITION : Error rate indicator.
The error rate of video and audio channels is displayed in 5 levels.

F1 : Cleaning roller controller
If heads are clogged, error rate indicators indicate "NG". In this case, keep the F1 (CLEANING) key pressed to clean the head. After cleaning, confirm that the error rate indicators indicate "GOOD".
For details, refer to Section 2-10, Cleaning Procedures for Head Clogging.

NOTE 1 : Clean the head in the PLAY or REC mode.
NOTE 2 : For excessive clogging, the head cannot be cleaned completely.
In this case, clean the head by the cleaning liquid or the cleaning piece moistened. For the cleaning, refer to Section 5-2. Cleaning.

3-3-2. RF PB ADJUST Menu

The RF PB ADJUST menu monitors the error occurring in a PB signal during normal PB and displays the error rate.

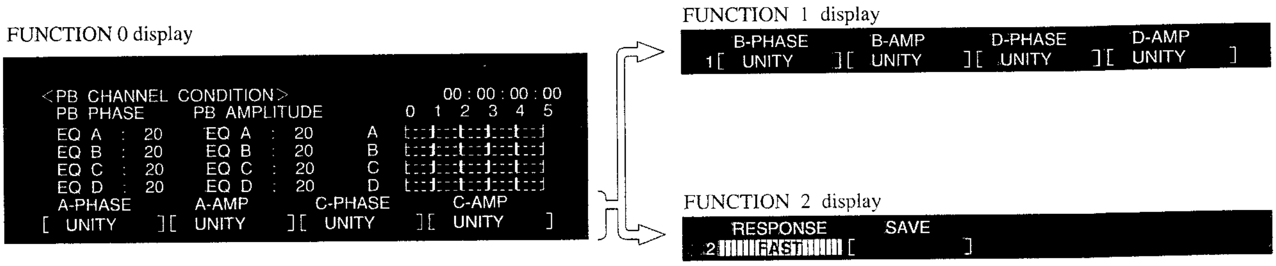
How to Enter the Menu Mode

1. Pressing the [SET UP] key while pressing the [SHIFT] key.
2. Press the cursor [V] key or turn a search dial clockwise, while pressing the [ENTRY] key with the center key to enter the <TEST> menu.
3. Press the cursor [V] key or turn the search dial clockwise to move the cursor to 815. [RF PB ADJUST MODE].
4. Press the cursor [>] key to move the cursor to EXECUTE.
5. Press the cursor [Λ] key to enter the RF PB ADJUST mode.
   The RF PB ADJUST screen is displayed on the display.
   Press the [SHIFT] key to display each ADJUST menu. Select the desired menu using [F1] through [F4] keys.

How to Exit the Menu Mode

Press the [SET UP] key to return to the control panel's initial screen. Press this key again.
The display can then return to the RF PB ADJUST MODE test menu screen (screen in step 3).

Explanation of Display



FUNCTION 0 display

```
<PB CHANNEL CONDITION>                00 : 00 : 00 : 00
 PB PHASE      PB AMPLITUDE           0  1  2  3  4  5
 EQ A  :  20    EQ A  :  20       A   t::j:::t::j:::t::j
 EQ B  :  20    EQ B  :  20       B   t::j:::t::j:::t::j
 EQ C  :  20    EQ C  :  20       C   t::j:::t::j:::t::j
 EQ D  :  20    EQ D  :  20       D   t::j:::t::j:::t::j
 A-PHASE        A-AMP         C-PHASE       C-AMP
[ UNITY     ][ UNITY     ][ UNITY     ][ UNITY     ]
```

FUNCTION 1 display

```
   B-PHASE        B-AMP         D-PHASE        D-AMP
 1[ UNITY     ][ UNITY     ][ UNITY     ][ UNITY     ]
```

FUNCTION 2 display

```
   RESPONSE      SAVE
 2||||||FAST|||||[              ]
```

NOTE : The function display in the function key changes as follows every time the [SHIFT] key is pressed :

- Display when the [SHIFT] key is not pressed : FUNCTION 0 display
- Display when the [SHIFT] key is pressed once in a FUNCTION 0 display : FUNCTION 1 display
- Display when the [SHIFT] key is pressed two times in a FUNCTION 0 display : FUNCTION 2 display

Function Key	Display	Function	Setting
F1	A-PHASE	Equalizer CH-A Phase Adjustment	UNITY / VAR
F2	A-AMP	Equalizer CH-A Frequency Response Characteristic Adjustment	UNITY / VAR
F3	C-PHASE	Equalizer CH-C Phase Adjustment	UNITY / VAR
F4	C-AMP	Equalizer CH-C Frequency Response Characteristic Adjustment	UNITY / VAR
SHIFT, F1	B-PHASE	Equalizer CH-B Phase Adjustment	UNITY / VAR
SHIFT, F2	B-AMP	Equalizer CH-B Frequency Response Characteristic Adjustment	UNITY / VAR
SHIFT, F3	D-PHASE	Equalizer CH-D Phase Adjustment	UNITY / VAR
SHIFT, F4	D-AMP	Equalizer CH-D Frequency Response Characteristic Adjustment	UNITY / VAR
SHIFT x 2, F1	RESPONSE	Error Rate Display Mode Select	FAST / SLOW
SHIFT x 2, F2	SAVE	RF Controll Data Save	

FUNCTION 0 display

F1 : Equalizer CH-A Phase Adjustment
F2 : Equalizer CH-A Frequency Response Characteristic Adjustment
F3 : Equalizer CH-C Phase Adjustment
F4 : Equalizer CH-C Frequency Response Characteristic Adjustment

FUNCTION 1 display

F1 : Equalizer CH-B Phase Adjustment
F2 : Equalizer CH-B Frequency Response Characteristic Adjustment
F3 : Equalizer CH-D Phase Adjustment
F4 : Equalizer CH-D Frequency Response Characteristic Adjustment

Press the F1 through F4 keys. The display in brackets [ ] on the screen lights up corresponding to each key. The channels above can be then specified. Press the F1 through F4 keys again. The display goes off. Only the specified channel is adjusted. The adjustment above can be performed when the center key is pressed and when the lighting block is set to VAR. For the adjustment, refer to Section 13, RF Signal System Adjustment.

FUNCTION 2 display

F1 : RESPONSE

This key is used for selecting a response speed for the CHANNEL CONDITION display (error rate display of each channel). The response speed setting can be changed from "FAST" to "SLOW" and vice versa every time this key is pressed.

F2 : SAVE

The data changed by the equalizer phase adjustment and equalizer frequency response characteristic adjustment cannot be written in NOVRAM as it is. Therefore, to write the value after adjustment in UNITY, it is necessary to write the control data to NOVRAM.
The data transfer is performed by the following procedure:

The F2 (SAVE) key is pressed, the display below appears in the message area on the right of the screen.

```
GO TO
   CHECKER MENU
   (807)
AND
   PUSH F4 (NVW)
```

Write the data to NOVRAM in the following procedure.

1. Return to the HOME menu by pressing the SET UP key.
   Press the SET UP key with the SHIFT key to enter the <TEST> menu.
2. Press the cursor ∨ key or turn the search dial to move the cursor to 807. [CHECKER MODE].
3. Press the cursor > key to move the cursor to EXECUTE. Press the cursor ∨ key to enter the CHECKER mode.
4. Press the F4 (NVW) key, then press a SET key of the monitor select key.
5. Press the F3 (/) key to display the changed address. Press the F3 (/) key continuously until message "PUSH NVWR SW" is displayed. To stop the operation halfway, press the SET UP key.
6. After message "PUSH NVWR SW" is displayed, press switch S71 (NVWR SW) on the SP-15 board (DVR-20 series) or SSP-07 board (DVR-28 series).
7. Confirm that message "READY" is displayed on the control panel. Data writing is then completed.
   Turn the unit power off. When the unit is powered on again, the UNITY value changes.

3-3-3. RF REC ADJUST Menu (This menu is not necessary for DVR-P20/P28 NTSC.)

The RF REC ADJUST menu compares a REC signal and simultaneous PB signal during REC and PB and displays the error rate.

How to Enter the Menu Mode

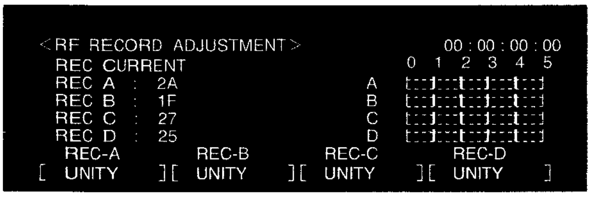
1. Press the SET UP key while pressing the SHIFT key.
2. Press the cursor V key or turn a search dial clockwise, while pressing the ENTRY key with the center key to enter the <TEST> menu.
3. Press the cursor V key or turn the search dial clockwise to move the cursor to 816. [RF REC ADJUST MODE].
4. Press the cursor > key to move the cursor to EXECUTE.
5. Press the cursor ^ key to ener the RF REC ADJUST mode.
   The RF REC ADJUST screen shown in Fig. 3-4 appears on the display.
   Press the SHIFT key to display each menu. Select the desired menu using F1 through F4 keys.

How to Exit the Menu Mode

Press the SET UP key to return to the control panel's initial screen. Press this key again.
The display can then return to the RF REC ADJUST test menu screen (screen in step 3).

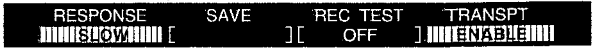
Explanation of Display

FUNCTION 0 display



```
<RF RECORD ADJUSTMENT>                      00 : 00 : 00 : 00
  REC CURRENT                               0  1  2  3  4  5
  REC A  :  2A                           A  
  REC B  :  1F                           B  
  REC C  :  27                           C  
  REC D  :  25                           D  
    REC-A         REC-B         REC-C         REC-D
[  UNITY     ][  UNITY     ][  UNITY     ][  UNITY      ]
```

FUNCTION 1 display



```
    RESPONSE          SAVE         REC TEST        TRANSPT
      SLOW       [             ][     OFF      ]    ENABLE
```

NOTE : The function display in the function key changes as follows every time the SHIFT key is pressed :

- Display when the SHIFT key is not pressed : FUNCTION 0 display
- Display when the SHIFT key is pressed once in a FUNCTION 0 display : FUNCTION 1 display

Function Key	Display	Function	Setting
F1	REC-A	CH-A Recording Current Adjustment	UNITY / VAR
F2	REC-B	CH-B Recording Current Adjustment	UNITY / VAR
F3	REC-C	CH-C Recording Current Adjustment	UNITY / VAR
F4	REC-D	CH-D Recording Current Adjustment	UNITY / VAR
SHIFT, F1	RESPONSE	Error Rate Display Mode Select	FAST / SLOW
SHIFT, F2	SAVE	RF Control Data Save Information	
SHIFT, F3	REC TEST	REC TEST Menu	ON / OFF
SHIFT, F4	TRANSPT	Servo System ON / OFF	ENABLE / DISABLE

FUNCTION 0 display

F1 : CH-A Recording Current Adjustment
F2 : CH-B Recording Current Adjustment
F3 : CH-C Recording Current Adjustment
F4 : CH-D Recording Current Adjustment

Press the F1 through F4 keys. The display in brackets [ ] on the screen lights up corresponding to each key. The channels above can be then specified. Press the F1 through F4 keys again. The display goes off. Only the specified channel is adjusted. The adjustment above can be performed when the center key is pressed and when the light-up block is set to VAR.
For the adjustment, refer to Section 13, RF Signal System Adjustment.

FUNCTION 1 display

F1 : RESPONSE

This key is used for selecting a response speed for the CHANNEL CONDITION display (error rate display of each channel). Response speed setting is changed from "FAST" to "SLOW" and vice versa every time this key is pressed.

F2 : SAVE

The data changed by the recording current adjustment cannot be written in NOVRAM as it is. Therefore, to write the value after adjustment in UNITY, it is necessary to write the control data to NOVRAM. The data transfer is performed by the following procedure :

The F2 (SAVE) key is pressed, the display appears in the message area on the right of the screen.

```
GO TO
   CHECKER MENU
   (807)
AND
   PUSH F4 (NVW)
```

Write the data to NOVRAM in the following procedure.

1. Return to the HOME menu by pressing the SET UP key.
   Press the SET UP key with the SHIFT key to enter the <TEST> menu.
2. Press the cursor ∨ key or turn the search dial to move the cursor to 807. [CHECKER MODE].
3. Press the cursor > key to move the cursor to EXECUTE. Press the cursor ∧ key to enter the CHECKER mode.
4. Press the F4 (NVW) key, then press a SET key of the monitor select key.
5. Press the F3 (/) key to display the changed address. Press the F3 (/) key continuously until message "PUSH NVWR SW" is displayed. To stop the operation halfway, press the SET UP key.
6. After message "PUSH NVWR SW" is displayed, press switch S71 (NVWR SW) on the SP-15 board (DVR-20 series) or SSP-07 board (DVR-28 series).
7. Confirm that message "READY" is displayed on the control panel. Data writing is then completed. Turn the unit power off. When the unit is powered on again, the UNITY value changes.

F3 : REC TEST

The REC TEST mode is set when this key is pressed while the F4 (TRANSPT) key shows the DISABLE display.
The REC TEST can be then selected ON or OFF.

F4 : TRANSPT

When this key is pressed, the display changes from ENABLE to DISABLE. The display below then appears on the right of the screen.

```
READY FOR
   REC-TEST
```

When DISABLE is displayed, the servo system function is disabled and the VTR is ready to enter the REC TEST menu.
When this key is pressed with the cassette loaded, an "EJECT CASSETTE" message is displayed on the screen.

3-4. PROC MENU

The PROC (PROCESSOR SYSTEM EE TEST) menu is used for checking and adjusting the video signal system and audio signal system.

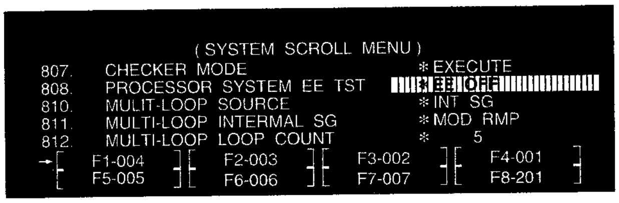
How to Enter the Menu Mode

1. Press the SET UP key while pressing the SHIFT key.
2. Press the cursor ∨ key or turn a search dial clockwise, while pressing the ENTRY key with the center key to enter the <TEST> menu.
3. Press the cursor ∨ key or turn the search dial clockwise to move the cursor to 808. [PROCESSOR SYSTEM EE TEST].
4. Press the cursor > key to move the cursor to EE OFF.

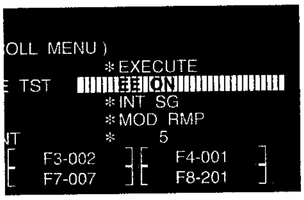
How to Exit the Menu Mode

Press the SET UP key to return to the control panel's initial screen. Press this key again.
The display can then return to the PROCESSOR SYSTEM EE test menu screen (screen in step 3).

Explanation of Display



```
                  ( SYSTEM  SCROLL  MENU )
807.   CHECKER  MODE                       * EXECUTE
808.   PROCESSOR  SYSTEM  EE  TST          * EE  OFF
810.   MULIT-LOOP  SOURCE                  * INT  SG
811.   MULTI-LOOP  INTERMAL  SG            * MOD  RMP
812.   MULTI-LOOP  LOOP  COUNT             *     5
→[   F1-004   ][   F2-003   ][   F3-002   ][   F4-001   ]
 [   F5-005   ][   F6-006   ][   F7-007   ][   F8-201   ]
```



```
OLL  MENU )
            * EXECUTE
E  TST        EE  ON
            * INT  SG
            * MOD  RMP
NT          *     5
[   F3-002   ][   F4-001   ]
[   F7-007   ][   F8-201   ]
```

Press the ENTRY key with the cursor ∧ key. The display changes from ON to OFF and vice versa.

ON : Used to check the EE output signal (SYSTEM EE) of video and audio signal systems.
If another menu is entered, it is automatically switched to OFF.

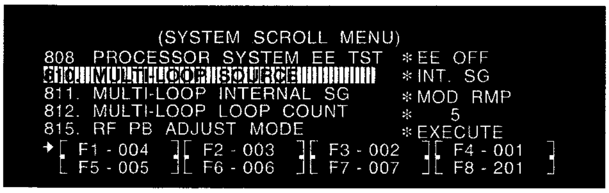
OFF : Used to check a normal signal.

3-5. MULTI-LOOP TEST

When A / D or D / A conversion is repeatedly performed during editing, video signals gradually deteriorate and distortion increases.
In order to minimize this distortion, a dummy loop circuit that is the same as the analog dubbing process can be created and the video signals can be passed through this circuit 5, 10, or 20 times to adjust the setup level, video level, chroma level, and hue.

How to Enter the Menu Mode

1. Press the SET UP key while pressing the SHIFT key.
2. Press the cursor V key or turn a search dial clockwise, while pressing the ENTRY key with the center key to enter the <TEST> menu.
3. A multi-loop test is operated in the three modes below.
   810 MULTI-LOOP SOURCE
   811 MULTI-LOOP INTERNAL SG
   812 MULTI-LOOP LOOP COUNT

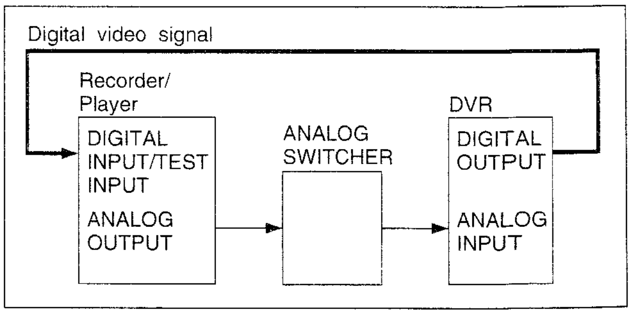


```
             (SYSTEM SCROLL MENU)
808  PROCESSOR SYSTEM EE TST  *EE OFF
810. MULTI-LOOP SOURCE        *INT. SG
811. MULTI-LOOP INTERNAL SG   *MOD RMP
812. MULTI-LOOP LOOP COUNT    *   5
815. RF PB ADJUST MODE        *EXECUTE
→[ F1 - 004 ][ F2 - 003 ][ F3 - 002 ][ F4 - 001 ]
 [ F5 - 005 ][ F6 - 006 ][ F7 - 007 ][ F8 - 201 ]
```

Four types of modes below are available to execute a multi-loop test.

- When adjusting without recording on the tape using INT SG as the reference signal (Section 3-5-1)
- When adjusting while recording on the tape using INT SG as the reference signal (Section 3-5-2)
  DVR-P20/P28 do not have this function.
- When adjusting without recording on the tape using signals recorded on the tape (Section 3-5-3)
- When adjusting while recording on the tape using signals recorded on the tape (Section 3-5-4)
  DVR-P20/P28 do not have this function.

NOTE : To loop two units using the DVR-10/18/20/28,
Set S4-8 on the PR-157/163 board to ON.
V jitters on the monitor screen will be reduced.
This setting is not necessary for DVR-P20/P28.
S4-8 of DVR-P20/P28 is set to ON, when shipped from factory.



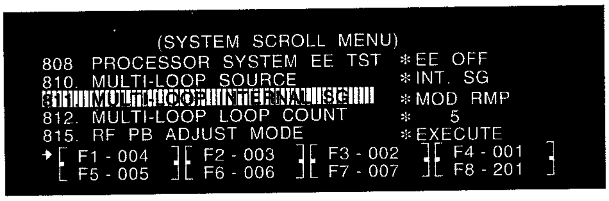
Sample Configuration for Multi-loop Test

3-5-1. When Adjusting without Recording on the Tape Using INT SG as the Reference Signal

1. Input an ANALOG OUTPUT VIDEO connector output signal to the ANALOG VIDEO INPUT connector. When performing the adjustment using a switcher, input the output signal to the ANALOG VIDEO INPUT connector via the switcher.

2. Select the TEST menu. Turn the search dial clockwise or press the cursor [V] key to move the cursor to 811. [MULTI-LOOP INTERNAL SG].

   NOTE : Confirm that the 810. [MULTI-LOOP SOURCE] menu is set to "INT SG".



```
          (SYSTEM SCROLL MENU)
808  PROCESSOR SYSTEM EE TST  *EE OFF
810. MULTI-LOOP SOURCE        *INT. SG
811. MULTI-LOOP INTERNAL SG   *MOD RMP
812. MULTI-LOOP LOOP COUNT    *    5
815. RF PB ADJUST MODE        *EXECUTE
→[ F1 - 004 ][ F2 - 003 ][ F3 - 002 ][ F4 - 001 ]
 [ F5 - 005 ][ F6 - 006 ][ F7 - 007 ][ F8 - 201 ]
```

3. Press the cursor [>] key and move the cursor to the right. The type of signals can be selected every time the cursor [Λ] key is pressed. In this menu, the signal selected using a cursor [Λ] key is input irrespective of the 202. [VIDEO INPUT SELECT] setting in a VIDEO IN / OUT menu. This setting is stored even if the power is turned off.

4. Select the desired signal using a cursor [Λ] key. (The signal source selected by this setting does not affect VIDEO IN.) MODULATED RAMP is set at the factory. After MODULATED RAMP is selected, press the cursor [<] key.

5. Press the cursor [V] key to select 812. [MULTI-LOOP LOOP COUNT]. Press the cursor [>] key. Then, select the desired number of loop times by pressing the cursor [V] key.
   In this loop, the system having the same characteristic as that of analog dubbing is connected by EE, and signals are input from VIDEO OUT to VIDEO IN and circulated at the rate of one generation per every field.

6. Press the [ENTRY] key to start a multi-loop test. The [ENTRY] key blinks during multi-loop test execution.
   Press the [ASM] (ASSEMBLE) button or [INS] (INSERT) button during multi-loop test execution, then press the [REC / EDIT] button. Signals can be recorded on tape. (Refer to Section 3-5-2.)
   NOTE : DVR-P20/P28 do not have this function.

7. Enter the VIDEO OUTPUT menu to execute various adjustments.

8. To terminate the multi-loop test, press the tape transport function button such as [STOP] or [PLAY].
   This test is also terminated when a tape transport function command is issued from REMOTE.

9. After adjustment is completed, the input signal of the ANALOG VIDEO INPUT connector is returned to an ordinary signal.

(FOR BKDV-200/201/202)

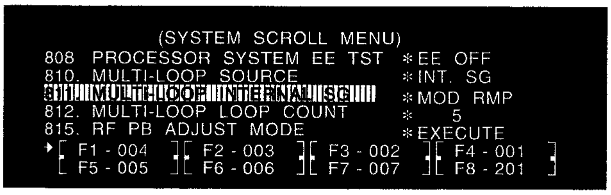
3-5-2. When Adjusting While Recording on the Tape Using INT SG as the Reference Signal

DVR-P20/P28 NTSC do not have this function.

1. Input an ANALOG OUTPUT VIDEO connector signal to the ANALOG VIDEO INPUT connector. When performing the adjustment using a switcher, input the output signal to the ANALOG VIDEO INPUT connector via the switcher.

2. Select the TEST menu. Turn the search dial clockwise or press the cursor ∨ key to move the cursor to 811. [MULTI-LOOP INTERNAL SG].

   NOTE : Confirm that the 810. [MULTI-LOOP SOURCE] menu is set to "INT SG".



```
              (SYSTEM SCROLL MENU)
808  PROCESSOR SYSTEM EE TST  *EE OFF
810. MULTI-LOOP SOURCE        *INT. SG
811. MULTI-LOOP INTERNAL SG   *MOD RMP
812. MULTI-LOOP LOOP COUNT    *   5
815. RF PB ADJUST MODE        *EXECUTE
→[ F1 - 004 ][ F2 - 003 ][ F3 - 002 ][ F4 - 001 ]
 [ F5 - 005 ][ F6 - 006 ][ F7 - 007 ][ F8 - 201 ]
```

3. Press the cursor > key and move the cursor to the right. The type of signals can be selected every time the cursor ∧ key is pressed. In this menu, the signal selected using a cursor ∧ key is input irrespective of the 202. [VIDEO INPUT SELECT] setting in a VIDEO IN / OUT menu. This setting is stored even if the power is turned off.

4. Select the desired signal using a cursor ∧ key. (The signal source selected by this setting does not affect VIDEO IN.) MODULATED RAMP is set at the factory. After MODULATED RAMP is selected, press the cursor < key.

5. Press the cursor ∨ key to select [812 MULTI-LOOP LOOP COUNT]. Press the cursor > key to execute [812 MULTI-LOOP LOOP COUNT]. Then, select the desired number of loop times by pressing the cursor ∨ key.
   In this loop, the system having the same characteristic as that of analog dubbing is connected by EE, and signals are input from VIDEO OUT to VIDEO IN and circulated at the rate of one generation per every field.

6. Press the ASM (ASSEMBLE) button or the INS (INSERT) button to select ASSEMBLE or INSERT mode. To enter CRASH REC mode, this selection is not required.

7. Thread a tape for recording.

8. Press the REC / EDIT button (in ASSEMBLE mode or INSERT mode) or press the REC / EDIT and PLAY buttons (in CRASH REC mode) simultaneously to start a multi-loop test. When the ASSEMBLE or INSERT mode is selected, a series of PREROLL, PLAY, and REC operations are automatically executed so that the tape position where the REC / EDIT button is pressed becomes the record starting point. The ENTRY key blinks during multi-loop test execution.

9. Enter the VIDEO OUTPUT menu to execute various adjustments.

10. To terminate the multi-loop test, press the STOP or EJECT button.
    This test is also terminated when a tape transport function command is issued from REMOTE.

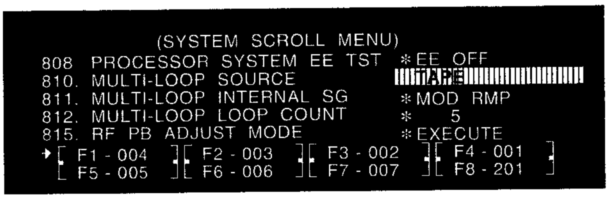
11. After adjustment is completed, the input signal of the ANALOG VIDEO INPUT connector is returned to an ordinary signal.

3-5-3. When Adjusting without Recording on the Tape Using signals Recorded on the Tape

1. Input an ANALOG OUTPUT VIDEO connection output signal to the ANALOG VIDEO INPUT connector. When performing the adjustment using a switcher, input the output signal to the ANALOG VIDEO INPUT connector via the switcher.

2. Install the prerecorded tape that has the record signal to be used as the reference signal.

3. Select the TEST menu. Turn the search dial clockwise or move the cursor to 810. [MULTI-LOOP SOURCE] using a cursor ∨ key. Press the cursor > key, then press the cursor ∧ key to select "TAPE".



```
              (SYSTEM  SCROLL  MENU)
808  PROCESSOR  SYSTEM  EE  TST   *EE  OFF
810. MULTI-LOOP  SOURCE            TAPE
811. MULTI-LOOP  INTERNAL  SG     *MOD  RMP
812. MULTI-LOOP  LOOP  COUNT      *    5
815. RF  PB  ADJUST  MODE         *EXECUTE
→[ F1 - 004   ][ F2 - 003   ][ F3 - 002   ][ F4 - 001   ]
 [ F5 - 005   ][ F6 - 006   ][ F7 - 007   ][ F8 - 201   ]
```

4. After selecting "TAPE", press the cursor < key.

5. Press the cursor ∨ key to select 812. [MULTI-LOOP LOOP COUNT]. Press the cursor < key to execute 812. [MULTI-LOOP LOOP COUNT]. Then, select the desired number of loop times by pressing the cursor ∨ key.
   In this loop, the system having the same characteristic as that of analog dubbing is connected by EE, and signals are input from VIDEO OUT to VIDEO IN and circulates at the rate of one generation per every field.

6. Find the picture of a desired signal in SHUTTLE, JOG, or PLAY mode.

7 Press the ENTRY key to start a multi-loop test. The ENTRY key blinks during multi-loop test execution.

8. Enter the VIDEO OUTPUT menu to execute various adjustments.
   Press the REC / EDIT button during multi-loop test execution. Signals can be recorded on tape. (Refer to Section 3-5-4.)
   NOTE : DVR-P20/P28 do not have this function.

9. To terminate the multi-loop test, press the tape transport function button such as STOP and PLAY.
   This test is also terminated when a tape transport function command is issued from REMOTE.

10. After adjustment is completed, the input signal of the ANALOG VIDEO INPUT connector is returned to an ordinary signal.

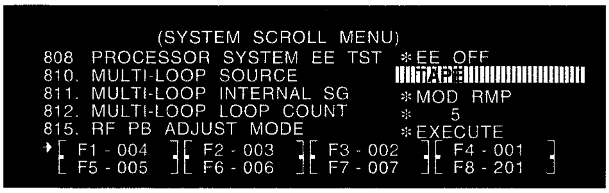
3-5-4. When Adjusting While Recording on the Tape Using signals Recorded on the Tape

DVR-P20/P28 NTSC do not have this function.

1. Input an ANALOG OUTPUT VIDEO connector output signal to the ANALOG VIDEO INPUT connector. When performing the adjustment using a switcher, input the output signal to the ANALOG VIDEO INPUT connector via the switcher.

2. Install the prerecorded tape that has the recorded signal to be used as the reference signal.

3. Select the TEST menu. Turn the search dial clockwise or press the cursor $\boxed{\vee}$ key to move the cursor to 810. [MULTI-LOOP SOURCE]. Press the cursor $\boxed{>}$ key, then press the cursor $\boxed{\wedge}$ key to select "TAPE".



```
              (SYSTEM SCROLL MENU)
808  PROCESSOR SYSTEM EE TST  *EE OFF
810. MULTI-LOOP SOURCE         TAPE
811. MULTI-LOOP INTERNAL SG   *MOD RMP
812. MULTI-LOOP LOOP COUNT    *   5
815. RF PB ADJUST MODE        *EXECUTE
→[ F1 - 004 ][ F2 - 003 ][ F3 - 002 ][ F4 - 001 ]
 [ F5 - 005 ][ F6 - 006 ][ F7 - 007 ][ F8 - 201 ]
```

4. After selecting "TAPE", press the cursor $\boxed{<}$ key.

5. Press the cursor $\boxed{\vee}$ key to select 812. [MULTI-LOOP LOOP COUNT]. Press the cursor $\boxed{>}$ key to execute 812. [MULTI-LOOP LOOP COUNT]. Then, select the desired number of loop times by pressing the cursor $\boxed{\vee}$ key.
   In this loop, the system having the same characteristic as that of analog dubbing is connected by EE, and signals are input from VIDEO OUT to VIDEO IN and circulated at the rate of one generation per ever field.

6. Find the picture of a desired signal in SHUTTLE, JOG, or PLAY mode.

7. Press the $\boxed{\text{ASM}}$ (ASSEMBLE) button or $\boxed{\text{INS}}$ (INSERT) button to select the ASSEMBLE or INSERT mode.
   When "TAPE" is selected in a 810. [MULTI-LOOP SOURCE] menu, CRASH REC is inhibited.

8. Press the $\boxed{\text{REC / EDIT}}$ button (ASSEMBLE or INSERT) to start a multi-loop test. A series of PREROLL, PLAY, and REC operations are automatically executed so that the tape position where the $\boxed{\text{REC / EDIT}}$ button is pressed becomes the record starting point. The $\boxed{\text{ENTRY}}$ key blinks during multi-loop test execution.

9. Press the $\boxed{\text{ENTRY}}$ key to start a multi-loop test. The $\boxed{\text{ENTRY}}$ key blinks during multi-loop test execution.

10. Enter the VIDEO OUTPUT menu to execute various adjustments.

11. To terminate the multi-loop test, press the tape transport function button such as $\boxed{\text{STOP}}$ or $\boxed{\text{PLAY}}$.
    This test is also terminated when a tape transport function command is issued from REMOTE.

12. After adjustment is completed, the input signal of the ANALOG VIDEO INPUT connector is returned to an ordinary signal.

3-6. CHECKER MENU

This menu consists of three sections (SP, SV, and UC). Test mode can be executed by entering the desired test mode command in each section. (Refer to Section 3-6-7. Checker Menu Chart.)

This menu is used when adjusting the servo system and tape transport system.

NOTE 1 : Be careful not to use the test mode not described in this manual. If the test mode is used, the corresponding operation cannot be guaranteed. To return to the normal state, turn the power on again.

NOTE 2 : Pay careful attention to the adjustments in this menu referring to Section 9, Tape Transport System Alignment and Section 10, Servo System Alignment. If several adjustments are incorrectly made in this menu, good-quality video and audio outputs may not be obtained or the tape or VTR mechanism system may be damaged.

How to Enter the Menu Mode

Press the keys on the control panel in the following sequence :

1. Press the [SET UP] key while pressing the [SHIFT] key.
2. Press the cursor [∨] key or turn a search dial clockwise, while pressing the [ENTRY] key with the center key to enter the <TEST> menu.
3. Press the cursor [∨] key or turn the search dial clockwise to move the cursor to 807. [CHECKER MODE].
4. Press the cursor [>] key to move the cursor to EXECUTE.
5. Press the cursor [∧] key to enter the CHECKER mode.
6. Enter each command using a function key or monitor select key.
   For how to enter commands, refer to Section 3-6-7. Checker Menu Chart.

How to Exit the Menu Mode

Press the [SET UP] key to return to the control panel's initial screen. Press this key again.
The display can then return to the CHECKER MODE test menu screen (screen in step 3).

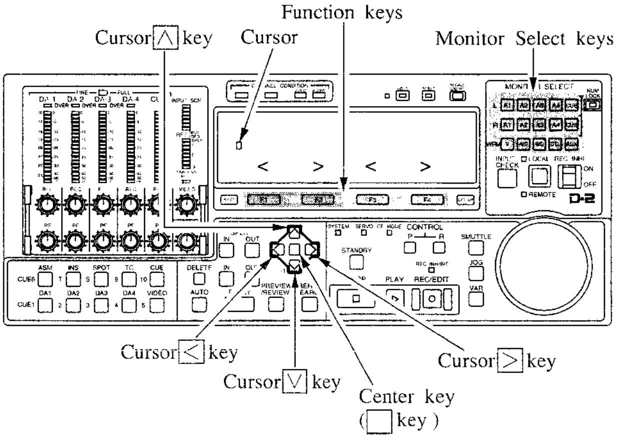
3-6-1. Key's Description

Function Keys

F1 (ALPH SET) : Used to enter an alphabetic character. Turn the search dial, specify the alphabetic character in the upper right of the display screen, then press this key. The specified alphabetic character is then entered.
F2 ($) : Press to enter "$".
F3 (/) : Used as a space key. (Advances to the next address for $ and $$ commands.)
F4 (NVW) : Used to write data in NOVRAM.

The function of the function key when the SHIFT key is pressed changes as described below (not including the F1 key).

F2 (WINDOW) : Moves the display area on the screen left. (The blink cursor moves right and left.)
F3 (BOARD) : Selects the SP, SV, and UC test modes.
To split this menu into SP, SV, and UC sections, press the SHIFT key.
The illustrated portion (< >) of the screen in the area where the cursor blinks is selected every time the F3 (BOARD) is pressed.
The displayed section is set in this case.


Function keys
Cursor ∧ key
Cursor
Monitor Select keys
< > < >
D-2
Cursor < key
Cursor ∨ key
Center key
(□ key)
Cursor > key

F4 (=) : Press to enter "=".

Monitor Select Key

The monitor select key is used to enter a command or data.
How to enter the command or data is explained by the display described on the sheet plane of the monitor select key.
To specify a numeric character and alphabetic character in a CHECKER menu using the monitor select key, use the sheet plane display of the monitor select key.

To enter an alphabetic character using the monitor select key, press the corresponding numeric key while holding down the INPUT CHECK button. (For BKDV-202, press the LOCAL / REMOTE button.)

NOTE : the NUM LOCK key is not used.

The numeric character and its corresponding alphabetic character are shown in the table below.

1	2	3	4	5	6	7	8	9	0
B	C	D	E	F					A

SET : Used when entering a command or data.
+ : Used as a space key. (Advances to the next address for $ and $$ commands.)
\- : Deletes one character before the cursor. (Returns to the previous address for $ and $$ commands.)
CLR : Not operate.

Cursor Key

In a servo checker, the cursor keys are used as function keys. The function is determined by the combination of three cursor keys, <, <, and ☐ (Center).
For explanations in this section, the cursor keys are referred to as f0 through f3.

f0 : ☐ + <
f1 : <
f2 : >
f3 : ☐ + <

NOTE : For f0 and f3, press the ☐ key and < key or > key at the same time.
However, when some of test commands are executed, each function is determined as the key is released.
Therefore, release the < or > key before releasing ☐ key.

3-6-2. List of Commands

Session	Command	Function	Page
SP	$, $$	Rewrites memory data.	P. 3-25
	= 0	Resets the system.	P. 3-25
	NVW	Transfers the rewritten data to NOVRAM.	P. 3-26
	E	Enables the E test mode	P. 3-27 ~ 3-34
	F	Enables the F test mode	P. 3-35 ~ 3-61
SV	$, $$	Rewrites memory data.	P. 3-64
	= 0	Resets the system.	P. 3-65
	B	Enables the B test mode	P. 3-66 ~ 3-67
	C	Enables the C test mode	P. 3-68 ~ 3-85
	D	Enables the D test mode	P. 3-86 ~ 3-118
UC	$, $$	Rewrites memory data.	P. 3-121
	= 0	Resets the UC board.	P. 3-122
	C	Enables the C test mode	P. 3-123 ~ 3-127
	D	Enables the D test mode	P. 3-128 ~ 3-130

3-6-3. Example of Command Usage

(1) When rewriting memory data ; SP session $ ($$) command, SV session $ ($$) command and
UC session $ ($$) command

Select the CHECKER menu according to "How to Enter the Menu Mode" in Section 3-6.

How to enter one-byte data

Change the data in address A879 to "00H". As the current data is displayed on the control panel, enter new data.

ex.

$ A 8 7 9 SET

SET → SET key of the monitor select key (Input by the monitor select key)

8 7 9 → Address

$ → F2 ($) key of the function key

A879 01 - 00

00 → New datat

01 → Present data

A879 → Address

As soon as data entry is completed, the cursor is moved to the position ready for the next byte of data.

How to proceed to the next operation

Return to the previous byte : Press the – key of the monitor select key.
Advance to the next byte : Press the F3 (/) key of the function key.
Complete the data entry : Press the SET key of the monitor select key. (Enters the command entry wait state.)

A87A 01 - – key of the monitor select key
A879 00 - _

<Moves to the previous byte.>

A87A 01 - F3 key of the monitor select key
A87B 04 - _

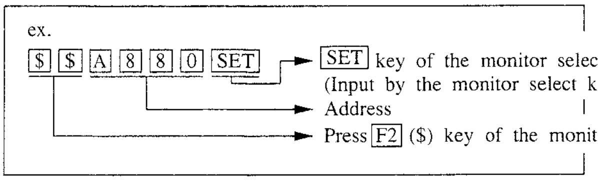
<Moves to the next byte.>

A87A 01 - SET key of the monitor select key
_

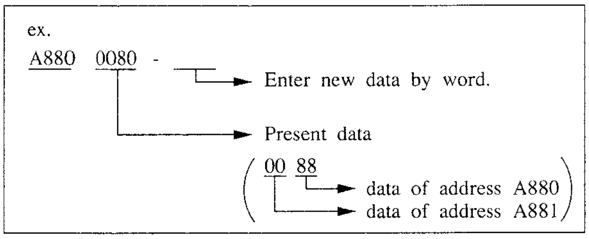
<Completes the data entry.>

How to enter one-word data

To rewrite data in one word, enter in the command entry wait state as follows :


ex.
$ $ A 8 8 0 SET
SET key of the monitor select key
(Input by the monitor select key)
Address
Press F2 ($) key of the monitor select key twice.

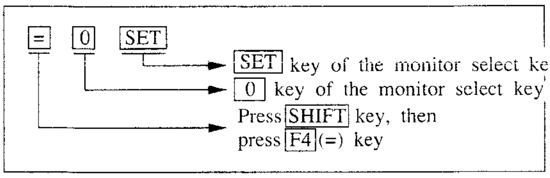
The control panel display is as shown below.


ex.
A880 0080 -
Enter new data by word.
Present data
00 88
data of address A880
data of address A881

The key operation is performed in the same way as for one-byte entry.

(2) System reset : SP session = 0 command and SV session = 0 command

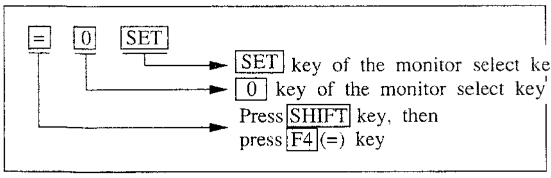
The system is reset to the same state as that when the power is turned on or when the CPU reset switch on the SP-15 (DVR-20/C20/20P) or SSP-07 board (DVR-28/28P) is pressed.
If this command is executed before the data is transferred to NOVRAM, the data changed by a $ or $$ command is lost.
Select the SP or SV test mode using a function key and enter using a SHIFT, F4 (=), 0, then SET key.


= 0 SET
SET key of the monitor select key
0 key of the monitor select key
Press SHIFT key, then
press F4 (=) key

The system is reset at that time.

(3) UC reset : UC session = 0 command

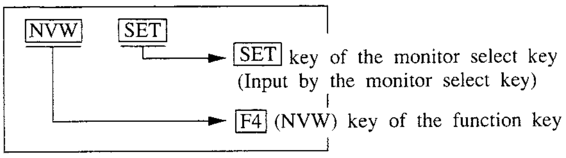
The UC board is reset to the same state as that when the power is turned on.
Select the UC test mode using a function key and enter using a SHIFT, F4 (=), 0, then SET key.


= 0 SET
SET key of the monitor select key
0 key of the monitor select key
Press SHIFT key, then
press F4 (=) key

The UC board is reset at that time.

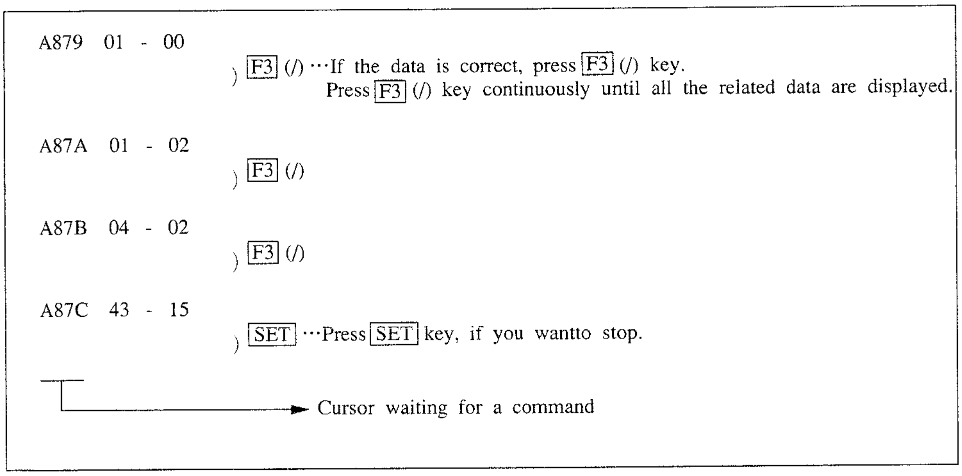
(4) Write of rewritten data to NOVRAM: SP session NVW command

The data changed by a $ or $$ command is lost when the system is reset or when the power is turned on again.
To store the rewritten data, the data must be written to NOVRAM by this command.
However, if you rewrite data, the original data is lost. Do not change the data thoughtlessly.
Select the SP test mode using a function key and enter using a [F4] (NVW) key, then [SET] key.


NVW
SET
SET key of the monitor select key (Input by the monitor select key)
F4 (NVW) key of the function key

NOTE : When "BASE SUM ERROR" is first displayed, it indicates that NOVRAM is faulty.
Confirm all the data items or replace NOVRAM.

The address in which data is changed, the data before change, and the data after change are displayed.
If the address and data are correct, press the [F3] (/) key. To stop the write, press the [SET] key. If the data in any unwanted address is changed, stop the write.


A879 01 - 00
F3 (/) ···If the data is correct, press F3 (/) key.
Press F3 (/) key continuously until all the related data are displayed.
A87A 01 - 02
F3 (/)
A87B 04 - 02
F3 (/)
A87C 43 - 15
SET ···Press SET key, if you wantto stop.
Cursor waiting for a command

After all the changed data items have been displayed, "PUSH NVWR SW" is displayed on the control panel. Press the NOVRAM WRITE switch (S71) on the SP-15 (DVR-20/C20/20P) or SSP-07 board (DVR-28/28P). Data is written.
When data write is completed, "READY" is displayed. The NVW command is then terminated.

SECTION 4
TOOLS AND MEASURING INSTRUMENTS

4-1. TOOLS

The necessary tools for inspection and part replacement of D-2 Series VTR are shown below.

Basic Knowledge
It is explained in the following items.

4-1-1. How to Use Tool

4-1-2. Tool Kit
- The main tools used for the D-2 Series VTR are stored in a carrying case.

4-1-3. Tools
- These tools are used for the D-2 Series VTR.
  Those stored in the Tool Kit are also introduced.
  The method of notating the name of each tool is as follows.

The tools whose names are enclosed are stored in the Tool Kit.

↓

Example: Reference Plate 2 ← Tool Kit List No.

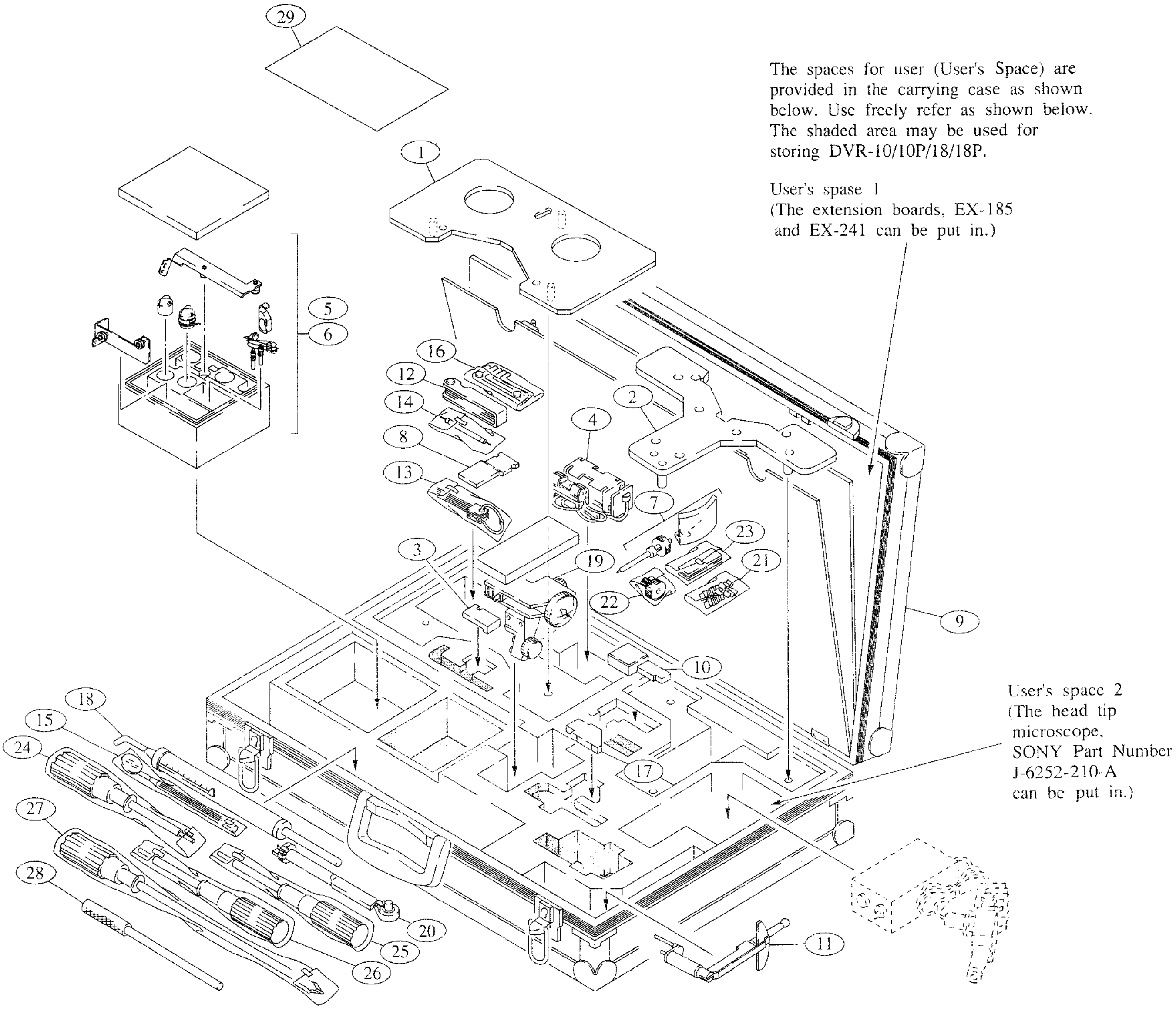
4-1-1. How to Use Tool

1. Caution Before Use
   Clean the surface of the tool used for mechanical adjustment with cleaning fluid before use. Confirm that no oil is left on the tool surface when the tape transport adjustment is performed.
   - Cleaning fluid (or the equivalent)
     SONY Part No. : 9-919-573-00
2. Tool Storage
   Clean the tool surface with cleaning fluid after it is used.
   Then, smear rust preventing oil slightly to the surface and store.
   - Oil
     SONY Part No. : 7-661-018-18
3. When the Scratch was Made on Tool
   Remove the convex portion on the tool surface using an oil stone (with finer particle). No accurate adjustment can be performed when the tool is used with the convex portion left. Take care not to damage the tool when it is handled.

4-1-2. Tool Kit

TOOL KIT : SONY Part No. J-6257-420-A

A Tool kit is provided for maintenance and inspection of DVR-20/28 series.
This tool kit includes major tools used for DVR-20/28 series. See "4-1-3. Tools" for each tool.



The spaces for user (User's Space) are provided in the carrying case as shown below. Use freely refer as shown below. The shaded area may be used for storing DVR-10/10P/18/18P.

User's spase 1
(The extension boards, EX-185 and EX-241 can be put in.)

User's space 2
(The head tip microscope, SONY Part Number J-6252-210-A can be put in.)

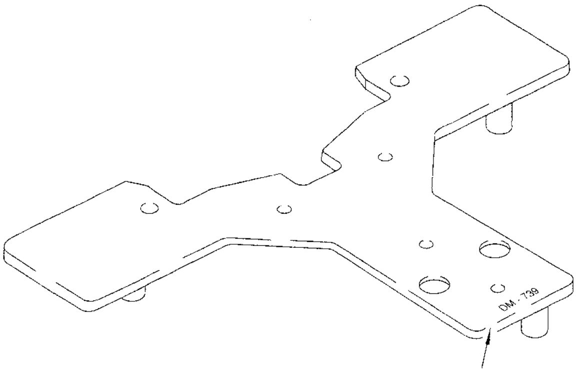
No.	Part No.	Discription	Tool kit J-6257-420-A		Note
			DVR-20	DVR-28	
1	J-6257-380-A	Reference Plate (20)	◎	—	Can be used for DVR-10/10P.
2	J-6257-390-A	Reference Plate (28)	—	◎	Can be used for DVR-18/18P.
3	J-6257-140-A	Confidence Head Adjustment Plate	◎	◎	Can be used for D2 series.
4	J-6253-750-A	Pinch Roller Check Tool	◎	◎	Can be used for D2 series.
5	J-6257-350-A	S Tension Regulator Adjustment Tool	◎	◎	
6	J-6257-360-A	T Tension Regulator Adjustment Tool	◎	◎	
7	J-6257-400-A	Upper Drum Attachment (A) Tool	◎	◎	Can be used for DVR-10P/18P.
8	J-6256-890-A	Tape Cleaner Adjustment Plate (20)	◎	◎	
9	J-6257-410-A	Carrying Case	◎	◎	Can be used for D2 series.
10	J-6253-340-A	Master Block (S3)	○	○	Commonly used for DVR-10/10P.
11	J-6251-210-A	Pinch Roller Adjustment Tool	○	○	Commonly used for D2 series.
12	J-6041-670-A	Thickness Gauge	○	○	Commonly used for D2 series.
13	J-6152-450-A	Wire Clearance Gauge Set	○	○	Commonly used for D2 series.
14	1-940-823-11	Rec Current Adjustment Cable	○	○	Commonly used for D2 series.
15	7-723-902-00	Dental Mirror	○	○	Commonly used for D2 series.
16	J-6041-700-C	L-Shaped Hexagonal Wrench Set	○	○	Commonly used for D2 series.
17	J-6252-190-B	Reel Table Height Adjustment Tool	○	○	Commonly used for D2 series.
18	J-6041-640-A	Tension Scale, 5 kg	—	○	Commonly used for DVR-18/18P.
19	J-6254-010-A	Inner Drum Eccentricity Adjustment Tool	○	○	Commonly used for DVR-10P/18P.
20	J-6254-660-A	Ratchet Wrench (Across Flat; 3 mm)	○	○	Commonly used for DVR-10P/18P.
21	J-6254-690-A	Upper Drum Position Confirm Spacer (T=3 μm)	○	○	Commonly used for DVR-10P/18P.
22	J-6254-700-A	Upper Drum Hexagonal Driver (Across Flat; 3 mm)	○	○	Commonly used for DVR-10P/18P.
23	J-6254-680-A	Slider Position Confirm Spacer	○	○	Commonly used for DVR-10P/18/18P.
24	J-6153-970-A	Hexagon Wrench Driver, 1.5 mm	○	○	Commonly used for D2 series.
25	7-700-766-03	Hexagon Wrench Driver, 2 mm	○	○	Commonly used for D2 series.
26	7-700-766-04	Hexagon Wrench Driver, 2.5 mm	○	○	Commonly used for D2 series.
27	7-721-052-04	Phillips Screwdriver (4×240)	○	—	Commonly used for DVR-10/10P.
28	J-6254-650-A	RG Set Pin	○	○	Commonly used for D2 series.
29	J-6257-420-1	List			

◎ marks are newly added tools.

4-1-3. Tools

Reference Plate (28) 2
SONY Part No. J-6257-390-A
For DVR-28/DVR-28P/DVR-P28

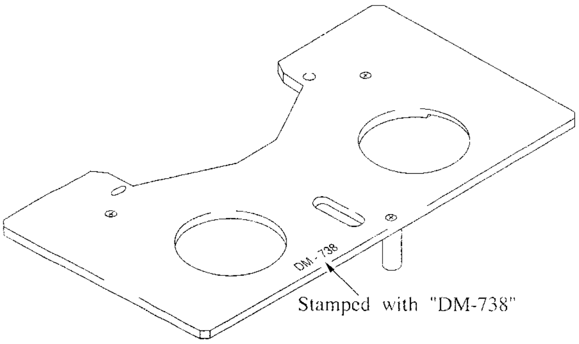
This is used for the height adjustment of the reel table.



Stamped with "DM-739"

Reference Plate (20) 1
SONY Part No. J-6257-380-A
For DVR-20/DVR-C20/DVR-20P/DVR-C20P/DVR-P20

This is used for the height adjustment of the reel table.



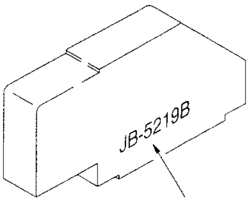
Stamped with "DM-738"

Note: The tool whose name are enclosed are stored in the Tool Kit.

Example: Reference Plate 2 ← Tool Kit List No.

Reel Table Height Adjustment Tool 17
SONY Part No. J-6252-190-B
For D2 series (except for Portable type)

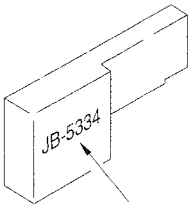
This is used for the reel table and the S6, T5 andT7 guides height adjustments (as for DVR-10 series, the S5, T4 and T6 guides).



Stamped with "JB-5219B"

Master Block (S3) 10
SONY Part No. J-6253-340-A
For DVR-10/DVR-C10/DVR-10P/DVR-C10P/
DVR-20/DVR-C20/DVR-20P/DVR-C20P//DVR-P20
DVR-28/DVR-28P/DVR-P28

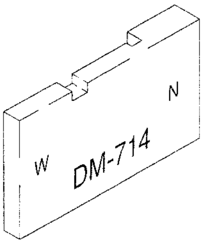
This is used for the S4 guide height adjustment (as for DVR-10 series, the S3 guide).



Stamped with "JB-5334"

Confidence Head Adjustment Plate 3
SONY Part No. J-6257-140-A
For DVR-20/DVR-C20/DVR-20P/DVR-C20P//DVR-P20
DVR-28/DVR-28P/DVR-P28

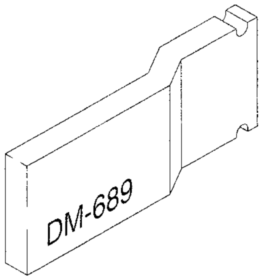
This is used for the CONFIDENCE head projection adjustment and the Audio head position adjustment, and the S4 and T5 guides width adjustments.
(DVR-P20/P28 is used only for width adjustment of S4/T5 guide.)



Tape Cleaner Adjustment Plate 8

SONY Part No. J-6256-890-A
For DVR-20/DVR-28/DVR-P20/DVR-P28

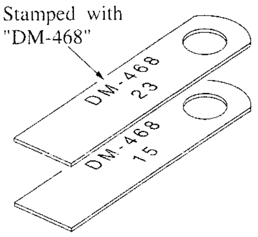
This is used for the tape cleaner projection adjustment.



Slider Position Confirm Spacer 23

SONY Part No. J-6254-680-A
For D2 series (except for Portable type)

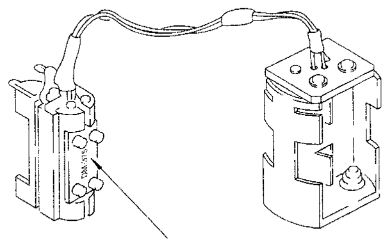
This is used for the clearance check between the slider rail and the S/T slider block.



Pinch Roller Check Tool 4

SONY Part No. J-6253-750-A
For DVR-20/DVR-C20/DVR-20P/DVR-C20P/DVR-P20
DVR-28/DVR-28P/DVR-P28

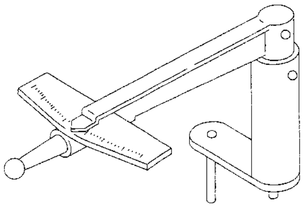
This is used for the pinch roller pressure plate azimuth check. Use for UM3 batteries for this tool.



Pinch Roller Adjustment Tool 11

SONY Part No. J-6251-210-A
For D2 series (except for Portable type)

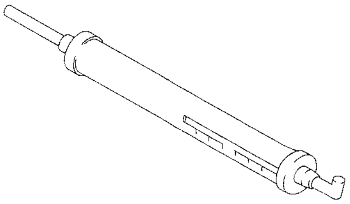
This is used for the pinch roller pressure measurement.



Tension Scale, 5kg 18

SONY Part No. J-6041-640-A
For DVR-28/DVR-28P/DVR-18/DVR-18P/DVR-P28

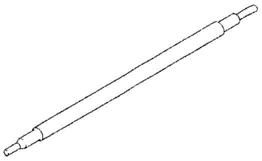
This is used for the tension adjustment of the timing belt for the reel shift.



Rec Current Adjustment Cable 14

SONY Part No. 1-940-823-11
For D2 series (except for Portable type)

This is used for the REC current adjustment of the rotary heads.



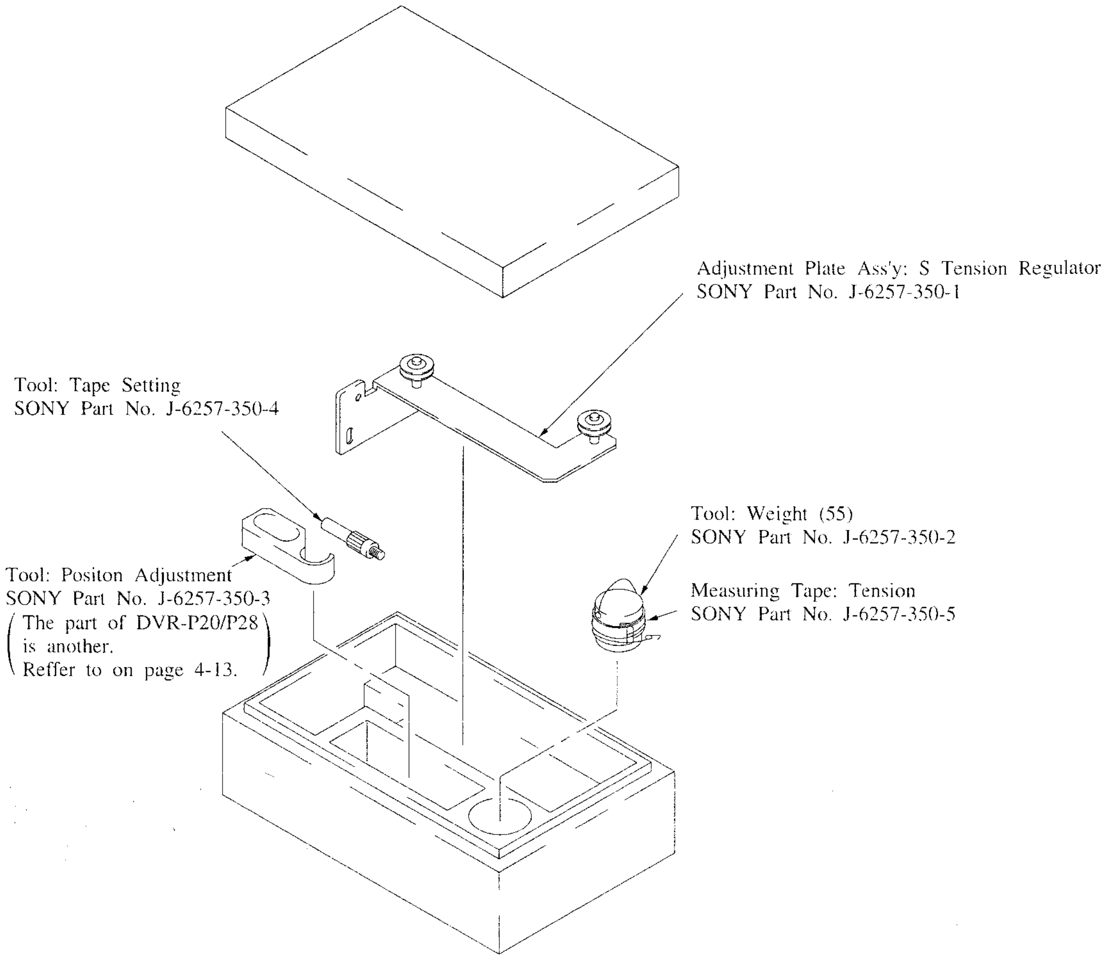
Note: The tool whose name are enclosed are stored in the Tool Kit.

Example: Reference Plate 2 ◄— Tool Kit List No.

S Tension Regulator Adjustment Tool 5

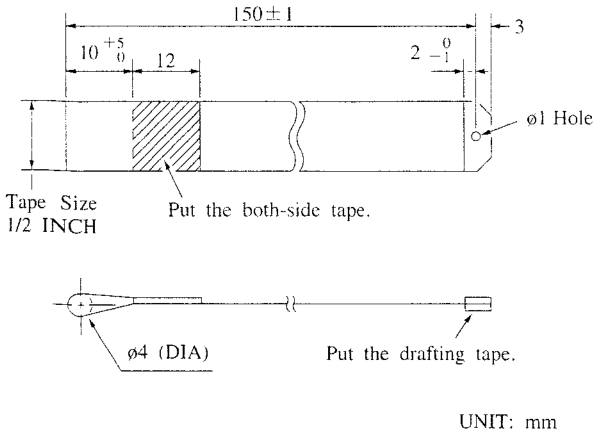
SONY Part No. J-6257-350-A
For DVR-20/DVR-C20/DVR-20P/DVR-C20P/DVR-P20/DVR-28/DVR-28P/DVR-P28

This is used for the S tension regulator arm tension adjustment.


Adjustment Plate Ass'y: S Tension Regulator
SONY Part No. J-6257-350-1
Tool: Tape Setting
SONY Part No. J-6257-350-4
Tool: Weight (55)
SONY Part No. J-6257-350-2
Tool: Positon Adjustment
SONY Part No. J-6257-350-3
(The part of DVR-P20/P28 is another. Reffer to on page 4-13.)
Measuring Tape: Tension
SONY Part No. J-6257-350-5

Tension Measuring Tape

When tape damaged, make the tape with the following figure.
Tape : Use the 1/2 INCH Metal tape or equivalents.

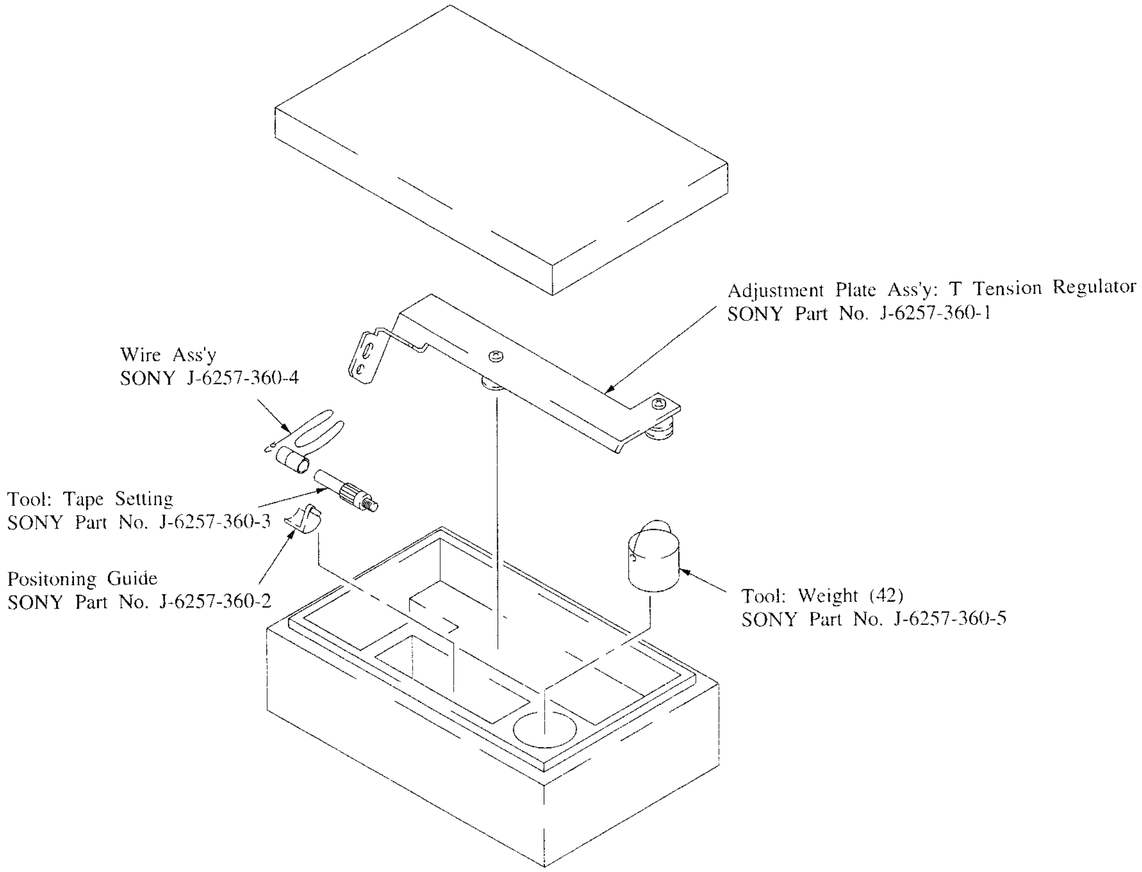

150±1
3
10 +5 0
12
2 0 -1
ø1 Hole
Tape Size
1/2 INCH
Put the both-side tape.
ø4 (DIA)
Put the drafting tape.
UNIT: mm

Note: The tool whose name are enclosed are stored in the Tool Kit.

Example: Reference Plate 2 ← Tool Kit List No.

T Tension Regulator Adjustment Tool 6
SONY Part No. J-6257-360-A
For DVR-20/DVR-C20/DVR-20P/DVR-C20P/DVR-P20/DVR-28/DVR-28P/DVR-P28

This is used for the T tension regulator arm tension adjustment.


Adjustment Plate Ass'y: T Tension Regulator
SONY Part No. J-6257-360-1
Wire Ass'y
SONY J-6257-360-4
Tool: Tape Setting
SONY Part No. J-6257-360-3
Positoning Guide
SONY Part No. J-6257-360-2
Tool: Weight (42)
SONY Part No. J-6257-360-5

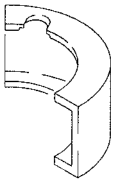
Note: The tool whose name are enclosed are stored in the Tool Kit.

Example: **Reference Plate** 2 ◄— Tool Kit List No.

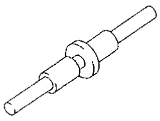
Upper Drum Attachment (A) Tool 7

SONY Part No. J-6257-400-A
For DVR-20/DVR-28/DVR-P20/DVR-P28

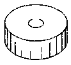
This is used for the rotary head protection of the inner drum when replacing the upper dram



Upper Drum Spacer
SONY Part No. J-6257-400-1



Disc Stopper Pin
SONY Part No. J-6257-400-2

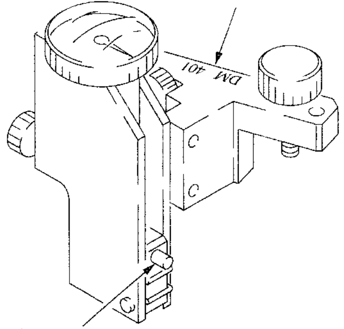


Cap
SONY Part No. J-6257-400-3

Inner Drum Eccentricity Adjustment Tool 19

SONY Part No. J-6254-010-A
For DVR-10P/DVR-18P/DVR-20/DVR-28/DVR-P20/DVR-P28

This is used for the head projection and the inner drum eccentricity adjustment.



Stamped with "DM-401"

Adjustment Pin
SONY Part No. J-6254-900-A

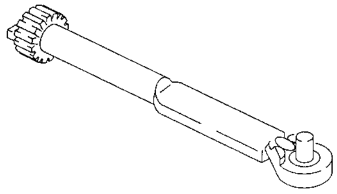
Note: The tool whose name are enclosed are stored in the Tool Kit.

Example: Reference Plate 2 ← Tool Kit List No.

Ratchet Wrench (Across Flat: 3 mm) 20

SONY Part No. J-6254-660-A
For DVR-10P/DVR-18P/DVR-20/DVR-28/DVR-P20/DVR-P28

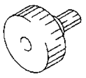
This is used to limit the tightening torque of the upper drum fixing screws when replacing the inner drum.



Upper Drum Hexagonal Driver (Across Flat: 3mm) 22

SONY Part No. J-6254-700-A
For DVR-10P/DVR-18P/DVR-20/DVR-28/DVR-P20/DVR-P28

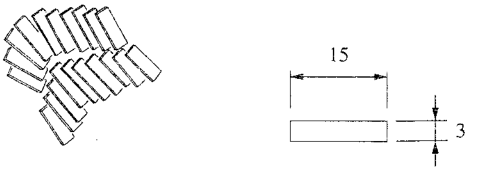
This is used for removing and installing the upper drum fixing screws when replacing the inner drum.



Upper Drum Position Confirm Spacer (T=3μm) 21

SONY Part No. J-6254-690-A
For DVR-10P/DVR-18P/DVR-20/DVR-28/DVR-P20/DVR-P28

This is used for the clearance check after replacing the upper drum. (1 package has 20 pieces.)

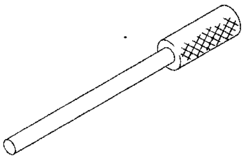


UNIT : mm

RG Set Pin 28

SONY Part No. J-6254-650-A
For D2 series (except for Portable type)

- This is used for potentiometer position adjustment.
- This is used for phase adjustment when replaced loading gear ass'y.

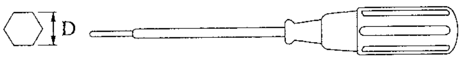


Hexagon Wrench Driver 24, 25, 26

1.5mm SONY Part No. J-6153-970-A

2mm SONY Part No. 7-700-766-03

2.5mm SONY Part No. 7-700-766-04



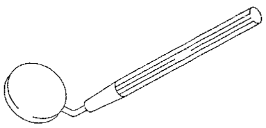
D = 1.5, 2.0 or 2.5 mm

Phillips Screwdriver (4x240) 27
SONY Part No. 7-721-052-04
For DVR-10/DVR-10P/DVR-20/DVR-P20

This is used for the cassette compartment position adjustment.

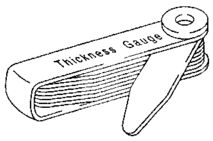
Dental Mirror 15
SONY Part No. 7-723-902-00
For D2 series (except for Portable type)

This is used for the tape running check.



Thickness Gauge 12
SONY Part No. J-6041-670-A
For D2 series (except for Portable type)

This is used for the position and clearance adjustments of mechanical parts.

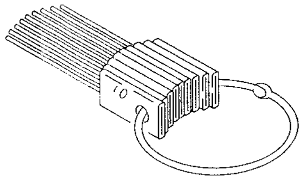


Thickness (mm)

0.03 0.04 0.08
0.09 0.10 0.11
0.12 0.13 0.14
0.15 0.20 0.25
0.30 0.35 0.40
0.45 0.50 0.60
0.75 0.80 0.90
1.00

Wire Clearance Gauge Set 13
SONY Part No. J-6152-450-A
For D2 series (except for Portable type)

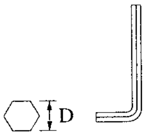
This is used for the gear block clearance adjustment.



Thickness (mm)

0.1 0.2
0.3 0.4
0.5 0.6
0.7 0.8
0.9 1.0

L-Shaped Hexagonal Wrench Set 16
SONY Part No. J-6041-700-C
or 7-700-735-00
For D2 series

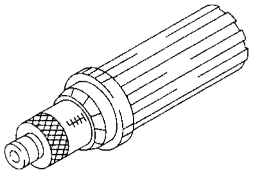


D (mm)	7-700-736-00	J-6041-700-C
1,27	○	○
1,4	○	
1,5	○	○
1,58	○	
2,0	○	○
2,5	○	○
3,0	○	○
4,0	○	○
5,0	○	○
6,0	○	
8,0	○	
10	○	
Ball Point 1,5		○
Ball Point 2,0		○
Ball Point 2,5		○

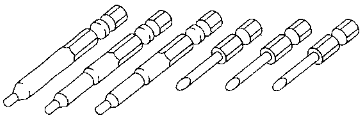
Note: The tool whose name are enclosed are stored in the Tool Kit.

Example: Reference Plate 2 ← Tool Kit List No.

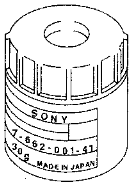
Torque-Screwdriver
6kg-cm SONY Part No. J-5252-510-A
12kg-cm SONY Part No. J-6252-520-A
26kg-cm SONY Part No. J-6252-530-A



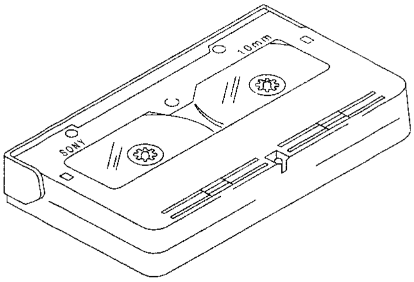
Bits Set of Torque-Screwdriver
SONY Part No. J-6252-540-A



Molyton Grease No.320 (30g Bottle)
SONY Part No. 7-662-001-41

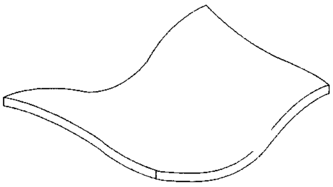

SONY
7-662-001-41
30g
MADE IN JAPAN

Cleaning Cassette, DCS-12CL or DCM-12CL
Standard Products

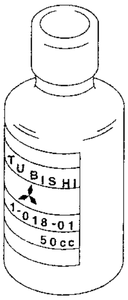


Cleaning Piece
SONY Part No. 2-034-697-00

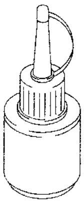
This is used for cleaning darum ass'y and stationary head.



Oil
SONY Part No. 7-661-018-18


TUBISHI
1-018-01
50cc

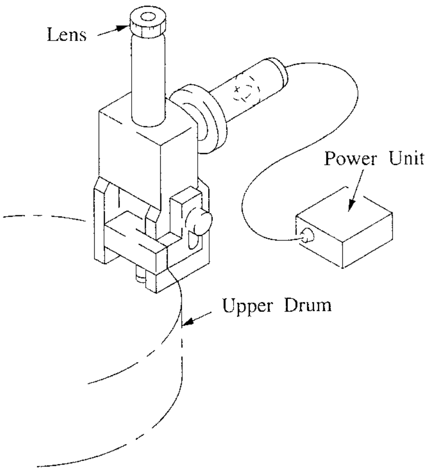
Cleaning Liquid
SONY Part No. 9-919-573-00



Head Chip Microscope

SONY Part No. J-6252-210-A

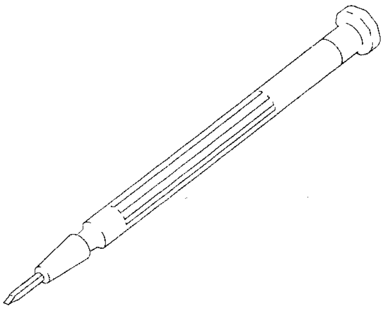
This is used for observing the surface of the video heads. Refer to the instruction sheet supplied to the microscope.



Adjustment Driber 1.3mm(ceramic)

SONY Part No. 7-721-052-81

This is used for adjustment of the variable resistor.



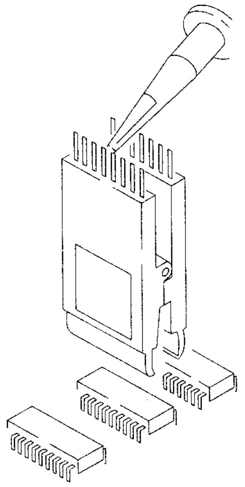
IC Test Clip

Type TC-16: SONY Part No. J-6041-770-A
Type TC-20: SONY Part No. J-6041-780-A

Manufactured by: AP PRODUCTS INCORPORATED

P.O. Box 697, 72 Corwin Drive,
Painesville, Ohio 44077, U.S.A.
Phone: (216) 354-2101

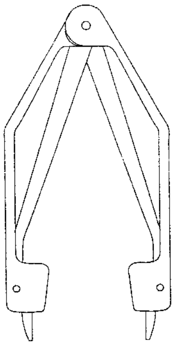
When connecting the test probe to the terminal of DIP integrated circuit for check or adjustment, these clips are convenient. Type TC-16 is used for DIP 14-pin or 16-pin IC and Type TC-20 for 18-pin or 20-pin IC.



PLCC IC Extraction Tool

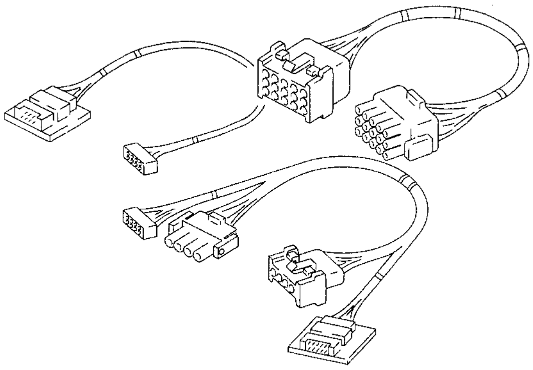
SONY Part No. J-6035-070-A

This tool is useful for extracking PLCC type ICs and fits ICs with 20 through 124 pins.



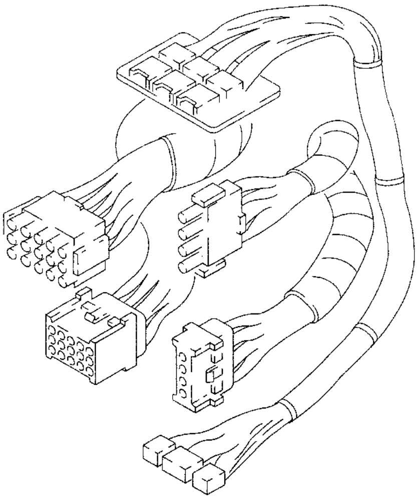
SW-REG Adjustment Extension Cable
SONY Part No. J-6264-690-A
For DVR-20/DVR-C20/DVR-20P/DVR-C20P/DVR-P20
DVR-10/DVR-C10/DVR-10P/DVR-C10P

This is used for the power supply adjustment.



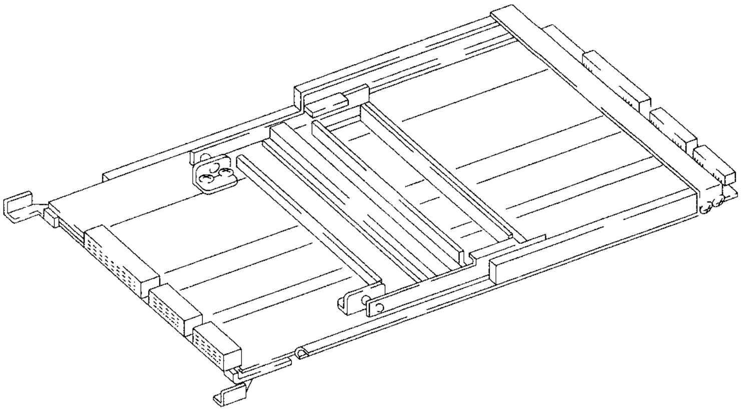
SW-REG Adjustment Extension Cable
SONY Part No. J-6266-460-A
For DVR-28/DVR-28P/DVR-P28/DVR-18/DVR-18P

This is used for the power supply adjustment.



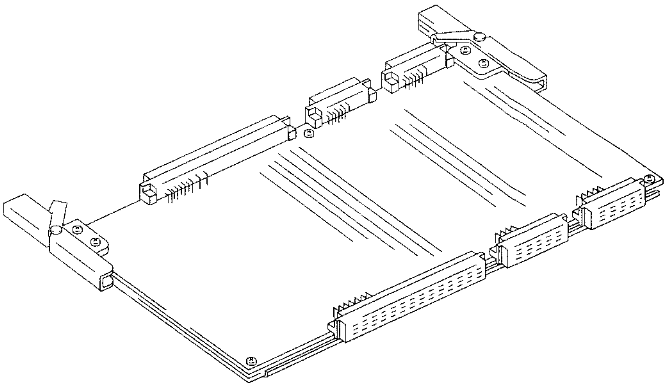
Extension Board, EX-341
SONY Part No. A-6001-038-A

This is used for checking and repairing the plug-in boards that are installed in the processor block. (This is not provided for DVR-P20/DVR-P28, but EX-341 (A) Extension Board is provided for other models.)
Extension Board, EX-341 (A)
SONY Part No. A-8274-193-A



Extension Board, EX-185
SONY Part No. A-6001-015-A

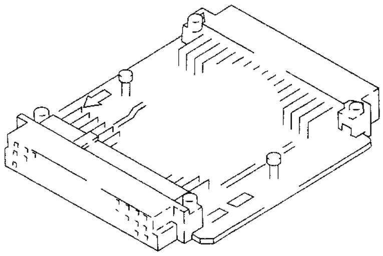
This is used for checking and repairing the plug-in boards that are installed in the card rack block. (This is not provided for DVR-P20/DVR-P28, but the EX-185 Extension Board of SONY Part No. A-8274-208-A is provided for other models.)



Extension Board, EX-241

SONY Part No. A-6025-144-A

This is used for checking and repairing the REC-11 board.



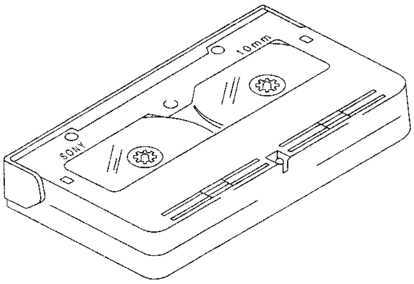
Alignment Tape

NTSC

ER2-2NTSC Mechanical Adjustment
SONY Part No. 8-960-071-12
ER5-2NTSC Electrical Adjustment
SONY Part No. 8-960-071-02

PAL

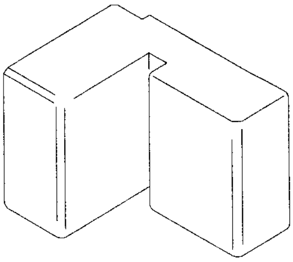
ER2-2PAL Mechanical Adjustment
SONY Part No. 8-960-071-62
ER5-2PAL Electrical Ajustment
SONY Part No. 8-960-071-52



RP head positioning tool

SONY Parts No. J-6257-650-A
For DVR-P20/DVR-P28

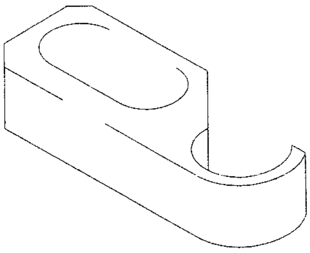
This is used for positioning the stationary head.



S Tension Regulator Position Adjustment Tool (P)

SONY Parts No. J-6257-880-A
For DVR-P20/DVR-P28

This is used for the S tension regulator arm tension adjustment.



4-2. MEASURING INSTRUMENTS

Oscilloscope
Equivalent product: 2445 or 2465/Tektronix
Band width: more than 150MHz

Digital Voltmeter
Equivalent product: 3435A/Hewlett Packard
Effective digits: more than 5 digits
Acculacy: 0.02% ± 1count

DC Current Meter
Range: 10A

Analog Test Signal Generator
NTSC

Equivalent product: (1) 1410/Tektronix and the following plug-in units
- SPG2 SYNC generator
- TSG1 Color bar generator
- TSG3 Linearity generator
- TSG6 Multiburst generator

(2) TSG170D/Tektronix

PAL

Equivalent product: (1) 1411/Tektronix and the following plug-in units
- SPG12 SYNC generator
- TSG11 Color bar generator
- TSG13 Linearity generator
- TSG16 Multiburst generator

(2) TSG-273/Tektronix

Vectorscope / Waveform Monitor
NTSC

Equivalent Product: 1750/Tektronix

PAL

Equivalent product: 1751/Tektronix

Waveform Monitor (When used Vectorscope)
Equivalent product: 1485R/Tektronix

Monitor
NTSC

Equivalent product: BVM-1910 or BVM-2010/SONY

PAL

Equivalent product: BVM-2010P/SONY

Audio Oscillator / Analyzer
Equivalent product: TM5006/Tektronix and the following plug-in units
- SG5010 Oscillator
- AA5001 Analyzer

Spectrum Analyzer
Equivalent product: 8568B/Hewlett Packard

Video Noise Meter
Equivalent product: UPSF2/Rohde & Schwarz

Frequency Counter
Equivalent product: 5315/Hewlett Packard

AC Current Probe
Equivalent product: P6022/Tektronix
Band width: more than 100MHz

4-3. ALIGNMENT TAPE

The ER5-2 alignment tape is for electrical adjustments.
The ER2-2 alignment tape is for mechanical adjustments.
The following signals are recorded on it.

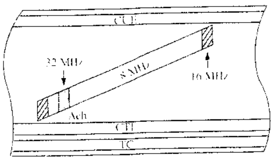
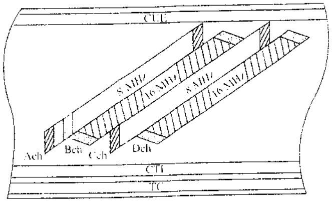
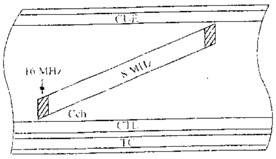
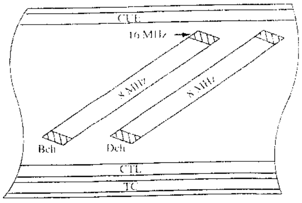
ER5-2 NTSC (SONY Part No.8-960-071-02)

TIME CODE min. sec	CUE	AUDIO		VIDEO	
		CONTENTS	USE	CONTENTS	USE
0.00	1kHz, 0VU	− ∞ dB (no sound)		LINEARITY CH-A&CH-C only	REC CURRENT ADJ. CH-A&CH-C
1.55					
2.00	10kHz, 0VU				
2.55					
3.00	1 kHz,-10VU				
3.55					
4.00	100Hz,-10VU				
4.25					
4.30	200Hz,-10VU				
4.55					
5.00	300Hz,-10VU	− ∞ dB (no sound)		LINEARITY CH-B&CH-D only	REC CURRENT ADJ. CH-B&CH-D
5.25					
5.30	500Hz,-10VU				
5.55					
6.00	3kHz,-10VU				
6.25					
6.30	5kHz,-10VU				
6.55					
7.00	7.5kHz,-10VU				
7.25					
7.30	10kHz,-10VU				
7.55					
8.00	12kHz,-10VU				
8.25					
10.00	1kHz, 0VU	1kHz,+20VU	DA MSB ADJUSTMENT (AD-49 Board)	LINEARITY	RF PLAYBACK EQUALIZER ADJUSTMENT (EQ-29 Board) GAIN,OFFSET ADJETTMENT (VM-05 Board)
11.55					
12.00	10kHz, 0VU				
12.55					
13.00	1kHz,-10VU				
13.55					
14.00	100kHz,-10VU				
14.25					
14.30	200Hz,-10VU				
14.55					
15.00	300Hz,-10VU				
15.25					
15.30	500Hz,-10VU				
15.55					
16.00	3kHz,-10VU				
16.25					
16.30	5kHz,-10VU				
16.55					
17.00	7.5kHz,-10VU				
17.25					
17.30	10kHz,-10VU				
17.55					
18.00	12kHz,-10VU				
18.25					
20.00		1kHz,0VU	GAIN ADJUSTMENT (LO-04 BOARD)	MULTI BURST	FREQUENCY RESPONSE ADJUSTMENT (VM-05 Board)
22.00				COLOR BARS	
24.00					REC CURRENT ADJ.

ER5-2 PAL (SONY Part No.8-960-071-52)

TIME CODE min. sec	CUE	AUDIO		VIDEO	
		CONTENTS	USE	CONTENTS	USE
0.00	1kHz, 0VU	− ∞ dB (no sound)		LINEARITY CH-A&CH-C only	REC CURRENT ADJ. CH-A&CH-C
1.55					
2.00	10kHz, 0VU				
2.55					
3.00	1 kHz,-10VU				
3.55					
4.00	100Hz,-10VU				
4.25					
4.30	200Hz,-10VU				
4.55					
5.00	300Hz,-10VU	− ∞ dB (no sound)		LINEARITY CH-B&CH-D only	REC CURRENT ADJ. CH-B&CH-D
5.25					
5.30	500Hz,-10VU				
5.55					
6.00	3kHz,-10VU				
6.25					
6.30	5kHz,-10VU				
6.55					
7.00	7.5kHz,-10VU				
7.25					
7.30	10kHz,-10VU				
7.55					
8.00	12kHz,-10VU				
8.25					
10.00	1kHz, 0VU	1kHz,+20VU	DA MSB ADJUSTMENT (AD-42 Board)	LINEARITY	RF PLAYBACK EQUALIZER ADJUSTMENT (EQ-29 Board) GAIN,OFFSET ADJUSTMENT (VM-05 Board)
11.55					
12.00	10kHz, 0VU				
12.55					
13.00	1kHz,-10VU				
13.55					
14.00	100kHz,-10VU				
14.25					
14.30	200Hz,-10VU				
14.55					
15.00	300Hz,-10VU				
15.25					
15.30	500Hz,-10VU				
15.55					
16.00	3kHz,-10VU				
16.25					
16.30	5kHz,-10VU				
16.55					
17.00	7.5kHz,-10VU				
17.25					
17.30	10kHz,-10VU				
17.55					
18.00	12kHz,-10VU				
18.25					
20.00		1kHz,0VU	GAIN ADJUSTMENT (LO-04 BOARD)	H-SWEEP	FREQUENCY RESPONSE ADJUSTMENT (VM-05 Board)
22.00				COLOR BARS	
24.00					REC CURRENT ADJ.

ER2-2 NTSC (SONY Part No.8-960-071-12)

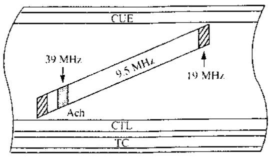
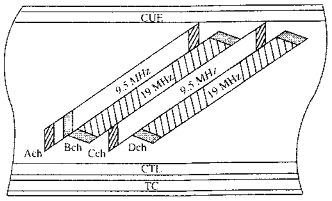
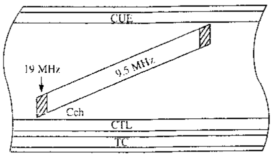
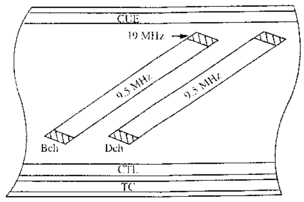
TIME CODE	CUE	CONTENTS	USE		TAPE FORMAT
	CONTENT/USE		For DVR-10/18 DVR-P20/P28	For DVR-20/28	
0:00	10kHz 0VU CUE HEAD AZIMUTH ADJ. (For DVR-20/28)	A ch ONLY (8MHz)	· TRACKING ADJ. · CTL POSITION ADJ. · PG PHASE ADJ. · CTL HEIGHT ADJ.	· TRACKING ADJ. (GUIDE ADJ.)	 CUE 32 MHz 8 MHz 16 MHz Ach CTL TC
15:00		A, C ch(8MHz) B, D ch(16MHz)	NOT USE	· CTL POSITION ADJ. · PG PHASE ADJ. · RECORD HEAD HEIGHT CHECK (A to D ch)	 CUE 8 MHz 16 MHz 8 MHz 16 MHz Ach Bch Cch Dch CTL TC
20:00		C ch ONLY (8MHz)	DVR-10/18 RECORD C ch HEAD HEIGHT CHECK DVR-P20/P28 NOT USE	NOT USE	 CUE 16 MHz 8 MHz Cch CTL TC
25:00		B, D ch (8MHz)	DVR-10/18 RECORD B, D ch HEAD HEIGHT CHECK DVR-P20/P28 NOT USE	NOT USE	 CUE 16 MHz 8 MHz 8 MHz Bch Dch CTL TC
30:00					

☐ : 32 MHz

▨ : 16 MHz

☐ : 8 MHz

ER2-2 PAL (SONY Part No.8-960-071-62)

TIME CODE	CUE	CONTENTS	USE		TAPE FORMAT
	CONTENT/USE		For DVR-10P/18P	For DVR-20P/28P	
0:00					
	10kHz 0VU CUE HEAD AZIMUTH ADJ. (For DVR-20P/28P)	A ch ONLY (9.5MHz)	· TRACKING ADJ. · CTL POSITION ADJ. · PG PHASE ADJ. · CTL HEIGHT ADJ.	· TRACKING ADJ. (GUIDE ADJ.)	 CUE 39 MHz 9.5 MHz 19 MHz Ach CTL TC
15:00		A, C ch(9.5MHz) B, D ch(19MHz)	NOT USE	· CTL POSITION ADJ. · PG PHASE ADJ. · RECORD HEAD HEIGHT CHECK (A to D ch)	 CUE 9.5 MHz 19 MHz 9.5 MHz 19 MHz Ach Bch Cch Dch CTL TC
20:00		C ch ONLY (9.5MHz)	RECORD C ch HEAD HEIGHT CHECK	NOT USE	 CUE 19 MHz 9.5 MHz Cch CTL TC
25:00		B, D ch (9.5MHz)	RECORD B, D ch HEAD HEIGHT CHECK	NOT USE	 CUE 19 MHz 9.5 MHz 9.5 MHz Bch Dch CTL TC
30:00					

☐ : 39 MHz
▨ : 19 MHz
☐ : 9.5 MHz

SECTION 5
PERIODIC CHECK AND MAINTENANCE

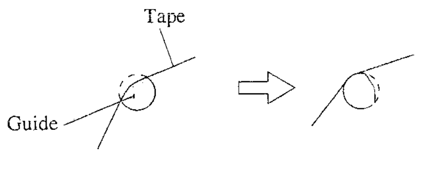
The periodic check and maintenance below must be performed to fulfill the function and performance of the set and to lengthen the life of the set and tape. Execute the item below as usual maintenance.

- **Cleaning of tape running path and sliding block (See Section 5-2.)**

5-1. PERIODIC CHECK ITEM

- The periodic check time of major parts is shown in the table. The replacement time shown in the table does not mean the guarantee time of parts. The grease smearing, check, and replacement time varies depending on the condition of the set to be used. Make a maintenence inspection schedule referring to them.
- **The time shown in this table is measured using a head hour meter (by Drum Running for the Brush Slip Ring Ass'y only). For more information, refer to the "Operation Manual".**
- If the object part is unknown, refer to the corresponding page of the Maintenance Manual (the page of the exploded view in the table).

Note 1: ◎ (rotation) indicates to rotate the guide so that the worn portion of a stationary guide does not touch the tape. Rotate the guide clockwise at intervals of 90 degrees as the reference.



Note 2: Symbol " ↑ " in the table indicates that the part in the column over it is automatically replaced during replacement.

○: Cleaning □: Smear grease △: Check (Adjustment) ☆: Replacement ◎: Rotation

BLOCK NAME OR PART NAME	Part No.	PAGE OF SECTION 21	HEAD HOURS METER (TIME)							REMARKS
			WEEKLY	MONTHLY	500	2500	5000	7500	10000	
TRACKING CHECK				△						
DRUM BLOCK										
DRUM Ass'y (DDH-27A-R)	A-6050-809-	21-28, 29	○				☆		☆	• As for cleaning, refer to Section 5-2. • As for Replacement, refer to Section 6-2.
INNER DRUM Ass'y (DDR-27-R)	A-6052-139-	21-28, 29	○		△		↑		↑	• As for Replacement, refer to Section 6-1.
BRUSH SLIP RING Ass'y	A-6053-084-	21-28, 29				☆	↑	☆	↑	• The hours shown in the table are based on the Drum Running Hours.
CLEANING ROLLER Ass'y	A-6049-086-	21-28, 29				△	☆	△	☆	
CLEANING ROLLER	X-3735-903-	21-28, 29			△	☆	↑	☆	↑	• When replacing the Inner-Drum Ass'y, replace the cleaning Roller.
CASSETTE COMPARTMENT BLOCK										
CASSETTE COMPARTMENT Ass'y	A-6028-015-	21-14, 15, 16, 17		○		□	□	☆	□	• As for cleaning, refer to Section 5-2. • As for Replacement, refer to Section 5-5.
S/T REEL TABLE BLOCK										
REEL TABLE Ass'y	A-6029-094-	21-18, 19, 20, 21		○				☆		• As for Cleaning, refer to Section 5-2.
REEL MOTOR (U-6C)	8-835-446-	21-18, 19, 20, 21						☆		
REEL BRAKE Ass'y	———	21-18, 19, 20, 21								
PLUNGER SOLENOID	1-454-487-	21-18, 19, 20, 21						☆		
BRAKE SHOE (S) Ass'y	X-3735-822-	21-18, 19				☆	☆	☆	☆	
BRAKE SHOE (T) Ass'y	X-3735-826-	21-20, 21				☆	☆	☆	☆	
FLEXIBLE CARD WIRE	1-590-998-	21-18, 19, 20, 21				△	△	☆	△	
REEL SHIFT BLOCK										
REEL SHIFT MOTOR (MNR-4000A)	8-835-047-	21-18, 19, 20, 21				△	△	☆	△	
PLUNGER SOLENOID	1-454-489-	21-18, 19, 20, 21				△	△	☆	△	
SUB PULLEY	3-735-956-	21-18, 19, 20, 21				△	△	☆	△	
BALL BEARING	3-735-856-	21-18, 19, 20, 21				△	△	☆	△	
TIMING BELT	3-735-961-	21-18, 19, 20, 21				△	△	☆	△	
WORM	3-735-958-	21-18, 19, 20, 21				□	□	□	□	
S TENSION REGULATOR BLOCK										
S TENSION REGULATOR Ass'y	A-6029-236-	21-22, 23				△	△	☆	△	
S TENSION REGULATOR ARM Ass'y	X-3166-006-	21-22, 23						↑		
ROLLER GUIDE Ass'y (S4 Guide)	X-3166-350-	21-22, 23	○			△	☆	△	☆	• As for Cleaning, refer to Section 5-2.
FLEXIBLE CARD WIRE	A-6029-248-	21-22, 23				△	△	☆	△	
S GUIDE BASE (TAPE SENSOR) BLOCK										
ROLLER GUIDE (N) Ass'y (S5 Guide)	X-3715-375-	21-22, 23	○			△	☆	△	☆	• As for Cleaning, refer to Section 5-2.
ROLLER GUIDE (X) Ass'y (S6 Guide)	X-3715-480-	21-22, 23	○			☆	☆	☆	☆	• As for Cleaning, refer to Section 5-2.
TAPE CLEANER BLOCK										
BRADE Ass'y	X-3166-945-	21-22, 23	○				△		△	
PLUNGER SOLENOID	1-454-487-	21-22, 23						☆		
ROLLER GUIDE (N) Ass'y (S3 Guide)	X-3715-375-	21-22, 23	○			△	☆	△	☆	• As for Cleaning, refer to Section 5-2.
FULL ERASE HEAD	8-825-770-	21-22, 23	○							• Perform replacement according to necessary.
T ARM BLOCK										
PINCH ROLLER (95°) Ass'y	X-3166-900-	21-24, 25	○		△	△	△	△	△	• Perform the Check/Cleaning every 500h. • When replacing the Inner durm Ass'ys, replace the Pinch Roller.
ROLLER GUIDE (N) Ass'y	X-3715-375-	21-24, 25				△	☆	△	☆	• As for Cleaning, refer to Section 5-2.

○: Cleaning   □: Smear grease   △: Check (Adjustment)   ☆: Replacement   ◎: Rotation   #: Cleaning & Lubrication

BLOCK NAME OR PART NAME	Part No.	PAGE OF SECTION 21	HEAD HOURS METER (TIME)							REMARKS
			WEEKLY	MONTHLY	500	2500	5000	7500	10000	
T GUIDE BASE BLOCK										
T TENSION REGULATOR Ass'y	A-6029-235-	21-24, 25				△	△	☆	△	
T TENSION REGULATOR Arm Ass'y (T6 Guide)	X-3165-940-	21-24, 25	○			☆	☆	↑	☆	
AIR DUMPER	3-173-109-	21-24, 25				△	△	↑		
ROLLER GUIDE (X) Ass'y (T7 Guide)	X-3715-480-	21-24, 25	○			☆	☆	☆	☆	• As for Cleaning, refer to Section 5-2.
PINCH ROLLER PRESS BLOCK										
PINCH PRESS PLATE	3-722-834-	21-26, 27				△	△	☆	△	
PLUNGER SOLENOID	1-454-434-	21-26, 27				#/△	#/☆	#/△	#/☆	
※ SUB PLUNGER SOLENOID	1-454-433- ※1-454-487-	21-26, 27				△	☆	△	☆	
SOLENOID PIN	3-172-926-	21-26, 27				△	△	☆	△	
STATIONARY HEAD BLOCK										
AUDIO/CTL HEAD	8-825-772-	21-26, 27	○			△	☆	△	☆	• As for Cleaning, refer to Section 5-2.
CONFIDENCE HEAD	8-825-777-	21-26, 27	○			△	☆	△	☆	• As for Cleaning, refer to Section 5-2.
STATIONARY FRANGE (T3 Guide)	3-722-827-	21-26, 27	○			◎	◎	☆	◎	• As for Cleaning, refer to Section 5-2.
STATIONARY GUIDE (T3 Guide)	3-722-828-	21-26, 27	○			◎	◎	☆	◎	• As for Cleaning, refer to Section 5-2.
CAPSTAN MOTOR (SCU-0201A)	8-835-444-	21-26, 27	○			△	☆	△	☆	• As for Cleaning, refer to Section 5-2.
SLIDER RAIL BLOCK										
SLIDER (S) Ass'y	A-6029-237-	21-28, 29				□/△	□/△	☆	□/△	
SLANT GUIDE (S1 Guide)	3-722-780-	21-28, 29	○			☆	☆	☆	☆	• As for Cleaning, refer to Section 5-2.
ACTUATER Ass'y (S2 Guide)	A-6029-239-	21-28, 29	○			△	△	☆	△	• As for Cleaning, refer to Section 5-2.
SLIDER (T) Ass'y	A-6029-238-	21-28, 29				□/△	□/△	☆	□/△	
SLANT GUIDE (T1 Guide)	3-722-780-	21-28, 29	○			☆	☆	☆	☆	• As for Cleaning, refer to Section 5-2.
ACTUATER Ass'y (T2 Guide)	A-6029-239-	21-28, 29	○			△	△	☆	△	• As for Cleaning, refer to Section 5-2.
L D RAIL	3-170-990-	21-28, 29		○		△	△	☆	△	• As for Cleaning, refer to Section 5-2.
V PLATE	3-170-937-	21-28, 29		○		△	△	☆	△	
LOADING MOTOR Ass'y										
LOADING MOTOR (MNR-7400A)	8-835-123-	21-30, 31				△	△	☆	△	
BALL BEARING	3-722-752-	21-30, 31				△	△	☆	△	
WORM GEAR (T)	3-715-435-	21-30, 31				□	□	□	□	• As for smear grease, refer to Seetion 5-5.
MAIN SHAFT BLOCK										
BALL BEARING	3-715-874-	21-30, 31				△	△	☆	△	
WORM GEAR (S)	3-715-436-	21-30, 31				□	□	□	□	• As for smear grease, refer to Seetion 5-5.
WORM GEAR (T)	3-715-435-	21-30, 31				□	□	□	□	• As for smear grease, refer to Seetion 5-5.
OPENER COVER	3-174-938-	21-18, 19		○				☆		
POWER SWITCH	1-570-877-	21-8, 9				△	△	☆	△	
FAN MOTOR (SMALL)	1-541-436-	21-10, 11						☆		• As for Cleaning, refer to Section 5-2.
FAN MOTOR (LARGE)	1-541-901-	21-10, 11						☆		• As for Cleaning, refer to Section 5-2.

5-4

5-4

5-2. CLEANING

Basic Knowledge

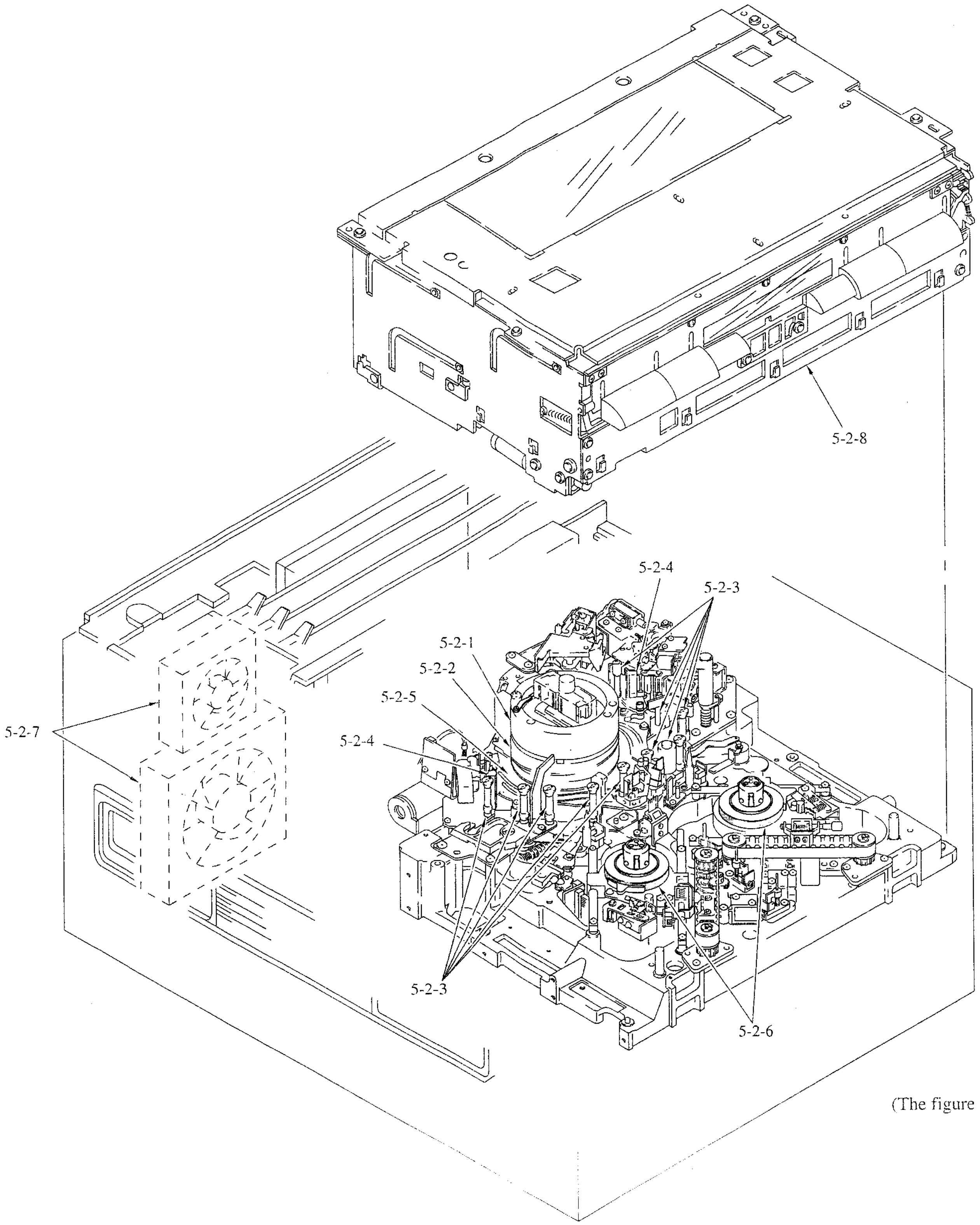
A. Pay attention to the following when cleaning:
  1. Turn the power off before cleaning.
  2. Each part (specially in the TTP block) of a machine is constituted by a precision part and adjusted precisely. Be careful not to damage each part or to apply an excessive force.
  3. Do not touch the portion to which grease is smeared when cleaning. If cleaning cloth is used with the grease attached, grease may attach to the places except those required. If grease attaches to cleaning cloth, replace the cleaning cloth with new one.

B. Clean the following places: (Fig. 5-2-1)
  - 5-2-1. Upper Drum's Tape Running Path and Rotary Head
  - 5-2-2. Lower Drum's Tape Running Path and Lead Surface
  - 5-2-3. Tape Running System
  - 5-2-4. Full Erase Head and Tape Cleaner (DVR-P28 has not the Full Erase Head.)
  - 5-2-5. Slider Rail
  - 5-2-6. Reel Table
  - 5-2-7. Fan Motor
  - 5-2-8. Cassette Compartment

C. Remove the Cassette Compartment before cleaning each place. For the removal of the Cassette compartment, See section 6-2.

D. Be sure to clean each place during periodic check. Increase the number of check times in accordance with the environment of the set to be used and perform the cleaning.

E. Usually clean each place with cleaning fluid. However, there are some places in which no cleaning fluid must be used. Before cleaning, refer to the basic knowledge.



(The figure is for DVR-28)

Fig. 5-2-1. Cleaning Place

5-2-1. Upper Drum's Tape Running Path and Rotary Head

Basic Knowledge

A. Prepare the following tools:
  - Cleaning Piece
    Sony Part No.: 2-034-697-00
  - Cleaning Fluid
    Sony Part No.: 9-919-573-00 or the equivalent
  - Cleaning Cassette Tape
    DCS-12CL or DCM-12CL
    (Standard Products)

B. Clean the upper drum's tape running path and rotary head while paying attention to the following: (Fig. 5-2-2)

Note 1: Do not rotate it in the direction opposite to the specified direction (direction indicated by the arrow) or clean it in the vertical direction when cleaning the rotary head. This may damage the rotary head.
Rotate the inner drum slowly in the specified direction and clean the rotary head along the circumference.

Note 2: Do not use a cotton swab when cleaning the rotary head.

Cleaning procedures

1. Press the cleaning piece moistened with cleaning fluid slightly against the upper drum's side surface and rotary head.
2. Rotate the inner drum slowly in the direction indicated by the arrow and clean the rotary head along the circumference two or three times.
3. After cleaning, clean it with dry cloth two or three times.
4. Use the cleaning cassette tape referring to How to use the cleaning cassette tape on the next page.

Note: For the cleaning of the upper drum's tape running path, clean the diagonally striped portion (the lower edge of the upper drum) shown in the figure with care.

Clean the upper drum's tape running path and rotary head every week.

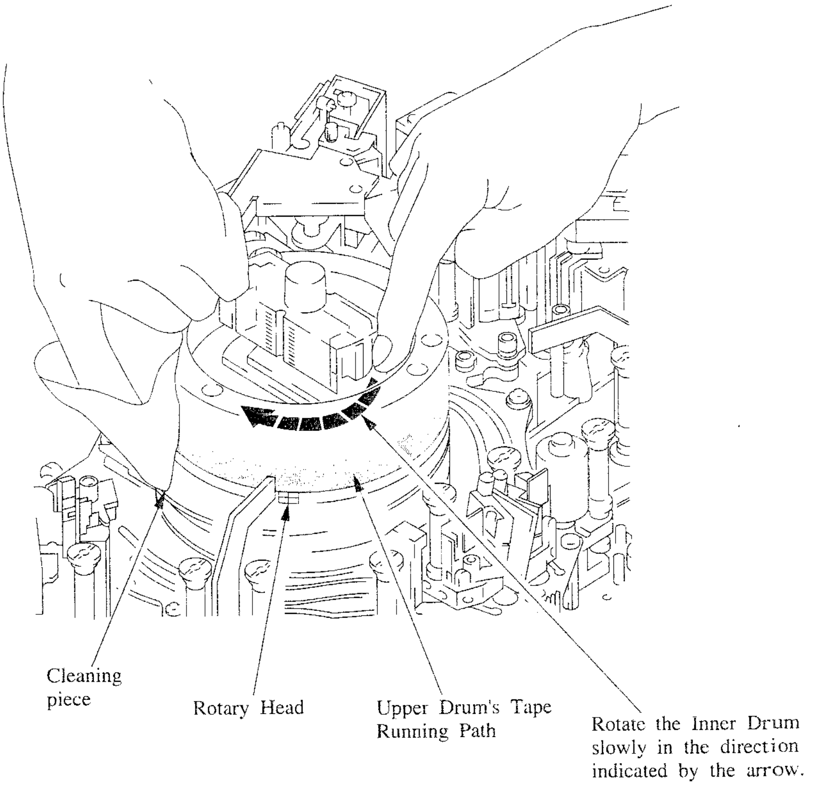

Cleaning piece
Rotary Head
Upper Drum's Tape Running Path
Rotate the Inner Drum slowly in the direction indicated by the arrow.

Fig. 5-2-2. Cleaning of Upper Drum's Tape Running Path and Rotary Heads

How to use cleaning cassette tape (Fig. 5-2-3)

- Cleaning cassette tape (DCS-12CL or DCM-12CL)

1. The cleaning cassette tape is used for removing the clog of the Rotary Head, and for repairing the delicate shape deformation on the surface of the Rotary Head. The cleaning cassette tape is used for periodical cleaning (once of a week), too.
2. It is no possibility of the Rotary Head is polished because of the cleaning cassette tape is low the efficacy of polish except DCS-7CL. But a cleaning finishes within five seconds into the PLAY mode. Do not play back the mode except the PLAY mode.
3. The cleaning cassette tape can be used only once. Do not rewind it for reuse.
4. About the details of how to use the cleaning cassette tape
   (1) Press the PLAY button just after injecting the cleaning cassette tape.
   (2) Be sure to press the EJECT button after playing back the cleaning cassette tape within five seconds. (If pressing the STOP button, the tape continues to touch onto the Rotary Head.)
   (3) Eject the cleaning cassette tape.

Head tip microscope (Fig. 5-2-4)

Use a head tip microscope to confirm that the head cleaning is performed completely.

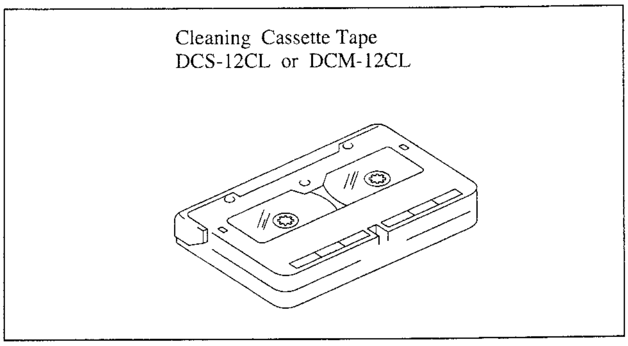

Cleaning Cassette Tape
DCS-12CL or DCM-12CL

Fig. 5-2-3. Cleaning cassette tape

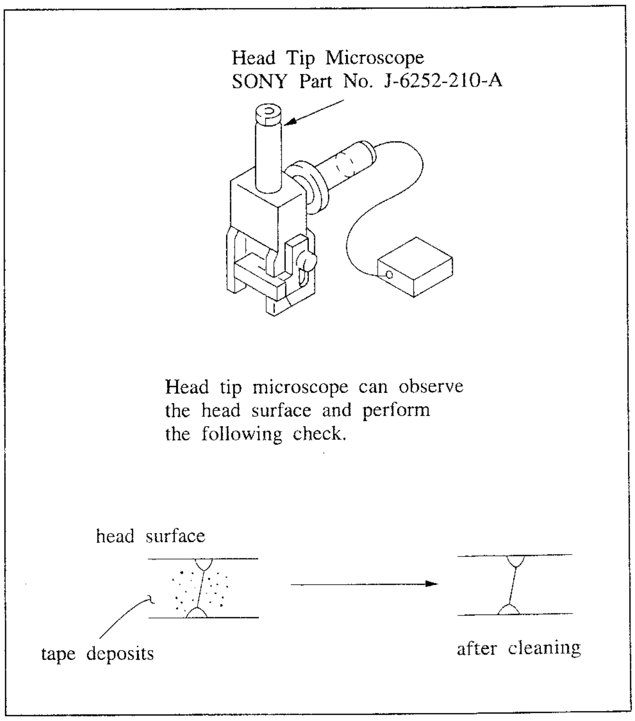

Head Tip Microscope
SONY Part No. J-6252-210-A
Head tip microscope can observe the head surface and perform the following check.
head surface
tape deposits
after cleaning

Fig. 5-2-4. Head tip microscope

5-2-2. Lower Drum's Tape Running Path and Lead Surface

Basic Knowledge

Prepare the following tools:

- Cleaning Piece
  Sony Part No.: 2-034-697-00
- Cleaning Fluid
  Sony Part No.: 9-919-573-00 or the equivalent
- Skewer or the equivalent (A metallic skewer cannot be used.)

Cleaning procedures (Fig. 5-2-5)

1. Put a skewer (or the equivalent) along the drum lead surface and eliminate the magnetic powder.
2. Clean the drum lead surface and lower drum's tape running path with cleaning piece moistened with cleaning fluid.
3. After cleaning, clean with dry cleaning piece two or three times.

Note 1: Tracking may be badly influenced when magnetic powder attaches to the drum lead surface. Clean the drum lead surface during periodic check.

Note 2: Do not use a metallic skewer instead of the skewer. This may damage the tape running path.

Clean the lower drum's tape running path and lead surface every week.

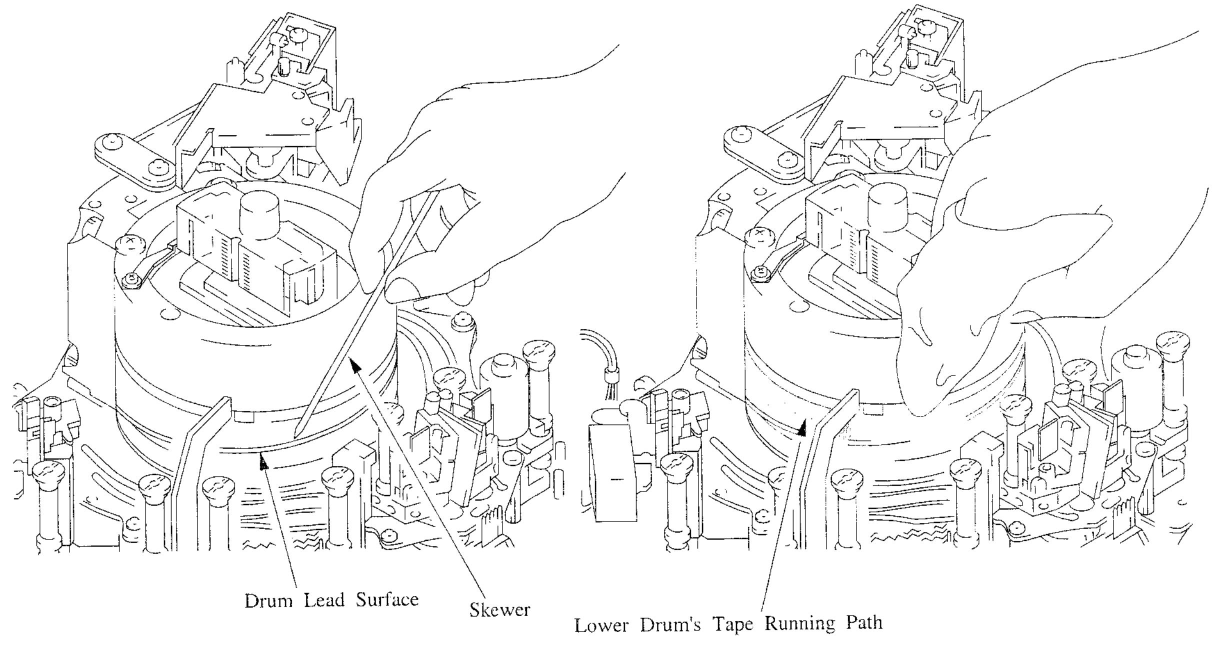


Fig. 5-2-5. Cleaning of Lower Drum's Tape Running Path and Lead Surface

5-2-3. Tape Running System

Basic Knowledge

Prepare the following tools:

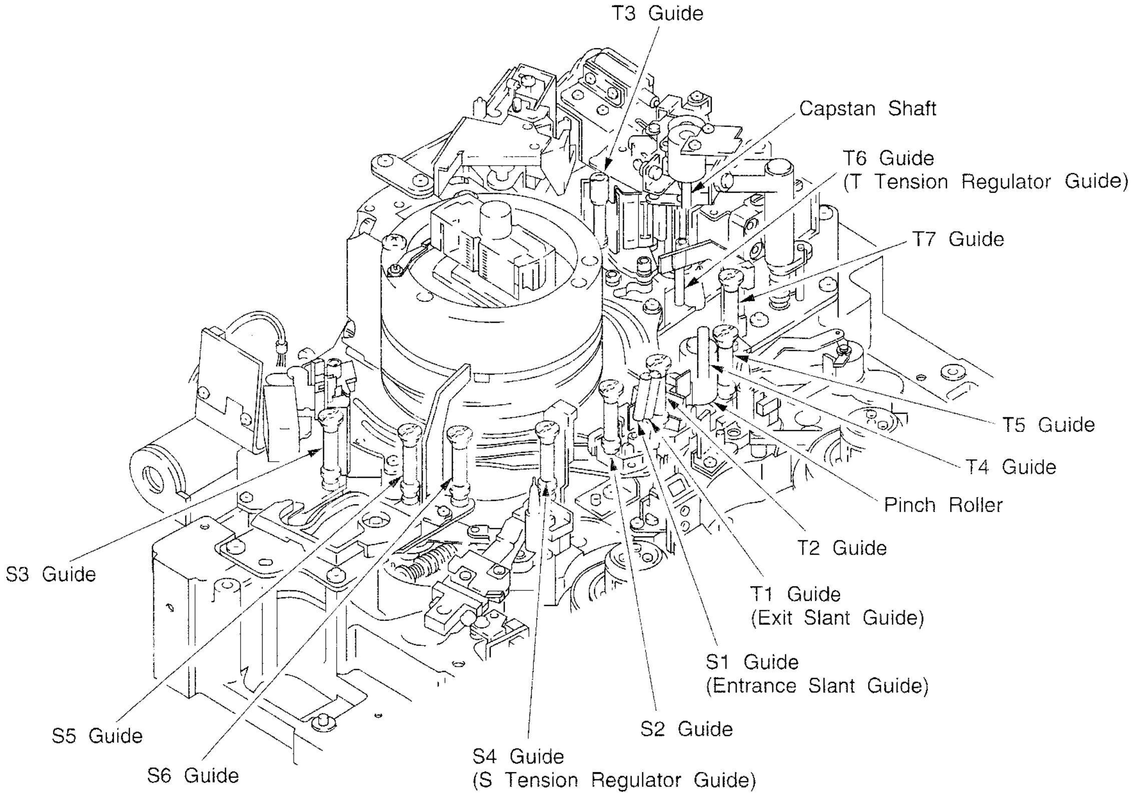
- Cleaning Piece
  Sony Part No.: 2-034-697-00
- Cleaning fluid
  Sony Part No.: 9-919-573-00 or the equivalent

1. Clean the tape running path of the guides shown in Fig. 5-2-6 with cleaning piece moistened with cleaning fluid.
2. After cleaning, clean with dry cleaning piece two or three times.

Note 1: The tape guide is constituted by a precision part. The height of each tape guide is adjusted precisely. Be careful not to apply an excessive force when cleaning.

Note 2: The tape powder or back-coated agent easily attaches near S1 and T1 guides. Remove stains completely from the guides.

Clean the tape running system every week.


T3 Guide
Capstan Shaft
T6 Guide
(T Tension Regulator Guide)
T7 Guide
T5 Guide
T4 Guide
Pinch Roller
T2 Guide
T1 Guide
(Exit Slant Guide)
S1 Guide
(Entrance Slant Guide)
S2 Guide
S4 Guide
(S Tension Regulator Guide)
S3 Guide
S5 Guide
S6 Guide

(The figure is for DVR-28)

Fig. 5-2-6. Cleaning of Tape Running System

5-2-4. Full Erase Head and Tape Cleaner

Basic Knowledge

A. Prepare the following tools:
- Cleaning Piece
  Sony Part No.: 2-034-697-00
- Cleaning Fluid
  Sony Part No.: 9-919-573-00 or the equivalent

B. The tape running surface of a tape cleaner has a sharp edge. Do not touch the edge with bare hands.

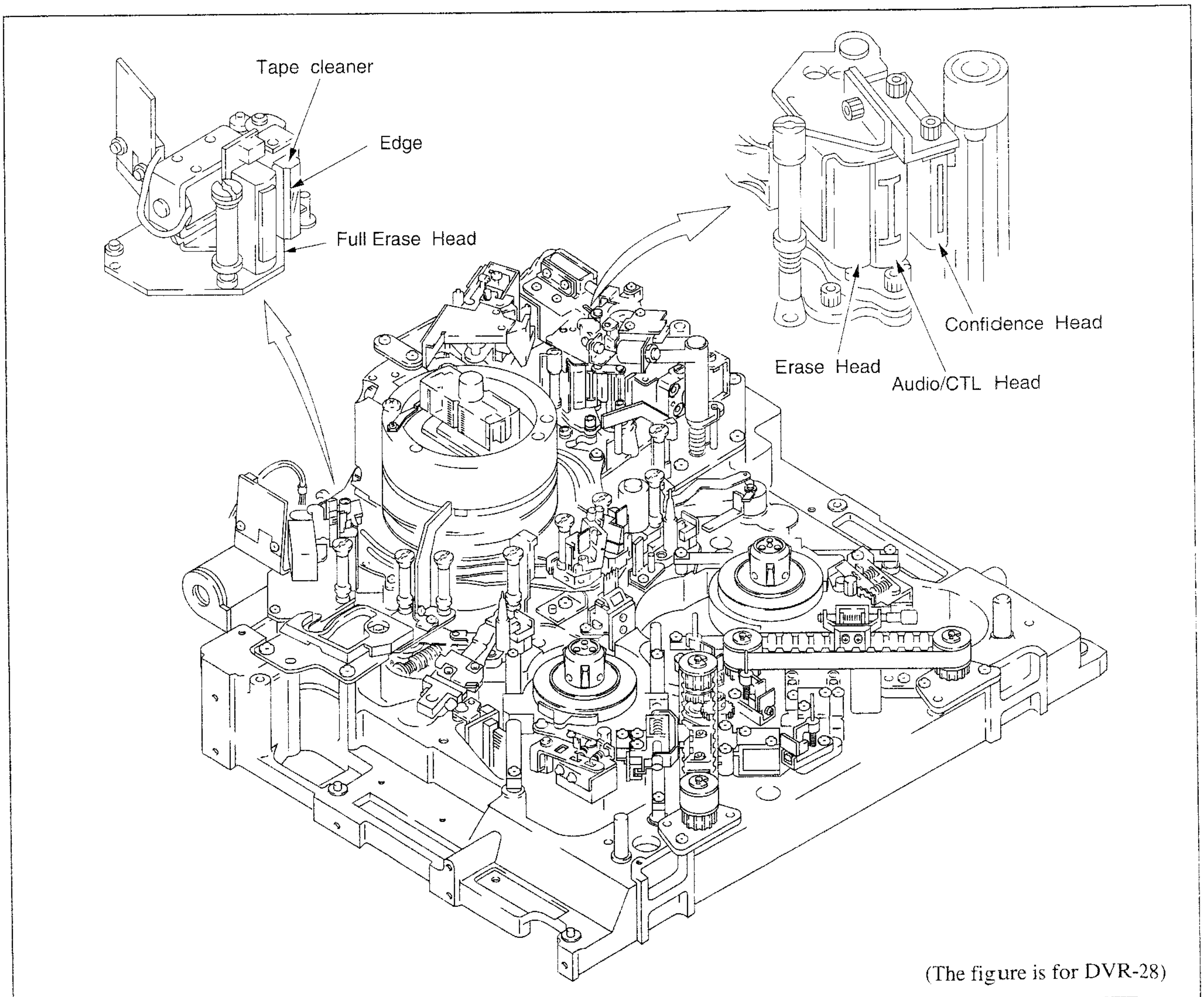
Cleaning procedures (Fig. 5-2-7)

1. Clean the tape running path of a head in the vertical direction with cleaning piece moistened with cleaning fluid.
2. Clean the tape running surface (sharp edge) of a tape cleaner with cleaning piece moistened with cleaning fluid.
3. After cleaning, clean with dry cleaning piece two or three times.

Note 1: An error may occur in the recording or playback when magnetic powder attaches to the head gap portion of a full erase head and stationary head. Be sure to clean the gap portion during periodic check.

Note 2: A full erase head, stationary head, and tape cleaner are constituted by a precision part. The installing position is also adjusted precisely. Be careful not to apply an excessive force when cleaning.

Clean the stationary head and tape cleaner every week.



(The figure is for DVR-28)

Fig. 5-2-7. Cleaning of Full Erase Head and Tape Cleaner

5-2-5. Slider Rail

Basic Knowledge

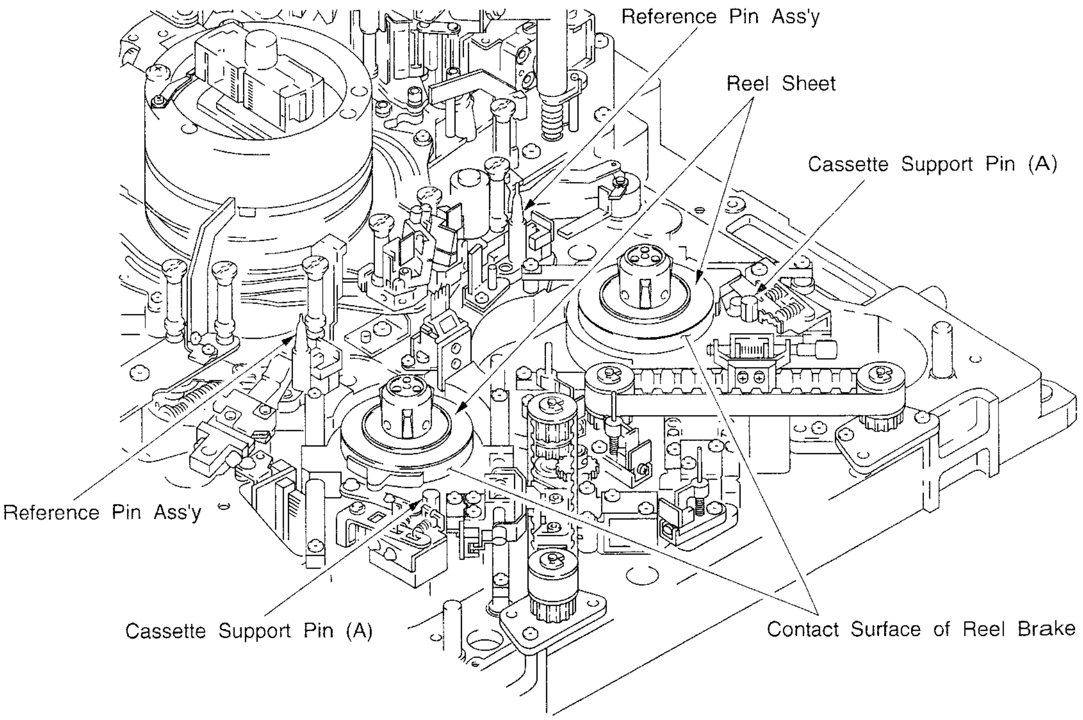
A. Prepare the following tools:
- Cloth (or gauze)
- Cleaning Fluid
  Sony Part No.: 9-919-573-00 or the equivalent

Cleaning procedures (Fig. 5-2-8)

1. Clean the slider running path of a slider rail with cloth (or gauze) moistened with cleaning fluid.
2. After cleaning, clean with dry cleaning piece two or three times.

Note: A trouble occurs in the last position control of a slider block when large dust attaches to the slider rail surface. This may cause the tracking shift. Be sure to clean the slider rail during periodic check.

Clean the slider rail during periodic check (every month).


Reference Pin Ass'y
Reel Sheet
Cassette Support Pin (A)
Reference Pin Ass'y
Cassette Support Pin (A)
Contact Surface of Reel Brake

(The figure is for DVR-28)

Fig. 5-2-8. Cleaning of Slider Rail

5-2-6. Reel Table

Basic Knowledge

A. Prepare the following tool:
- Cloth (or gauze)

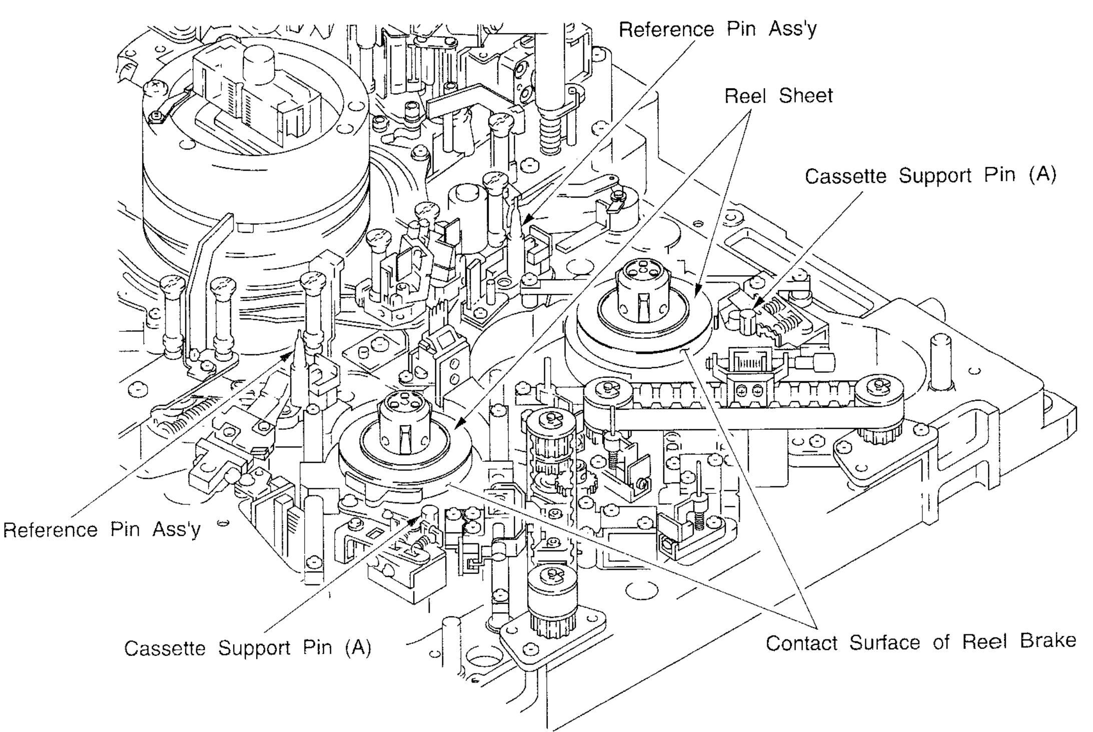
Cleaning procedures (Fig. 5-2-9)

1. Clean the cassette reel support surface of a reel table and the contact surface of a reel brake with dry cloth.
2. Clean the Cassette Support Pin (A) and Reference Pin Ass'y with dry cloth.

Clean the reel table every month.

Note 1: Do not use cleaning fluid. Take care that no cleaning fluid attaches to the brake shoe. This deteriorates the characteristic of a reel brake and shortens the life of the part.

Note 2: Confirm the stains on the cassette reel support surface and at the cassette support pin when a new tape is used frequently. The powder that is generated by the rubbing of a cassette case attaches to the reel table and cassette support pin. This may exert a bad influence on the tape running.
Increase the number of check times during periodic check and in accordance with the environment of the set to be used, then perform the cleaning.


Reference Pin Ass'y
Reel Sheet
Cassette Support Pin (A)
Reference Pin Ass'y
Cassette Support Pin (A)
Contact Surface of Reel Brake

(The figure is for DVR-28)

Fig. 5-2-9. Cleaning of Reel Table Block

5-2-7. DC Fan Motor

Basic Knowledge

A. Prepare the following tools:

- Cleaning Fluid
  Sony Part No.: 9-919-573-00 or the equivalent
- Nylon brush (or the equivalent) (A metallic brush cannot be used.)

Cleaning procedures (Fig. 5-2-11)

- Fan cover cleaning
  As shown in the figure, remove the dust by a dry brush and absorb it using a vacuum cleaner.
- Fin block cleaning
  As shown in the figure, clean the fin block of a fan motor in the same manner as in the fan cover (See section 2 for removal).

Note: The temperature in the set increases when dust attaches to the opening block of a DC fan motor and when the air flow is disturbed. This may badly influence the performance and life of the machine. Clean the DC fan motor (Fig. 5-2-10), especially fan cover on the rear panel during periodic check because they easily contain dust.

Clean the DC fan motor every month.

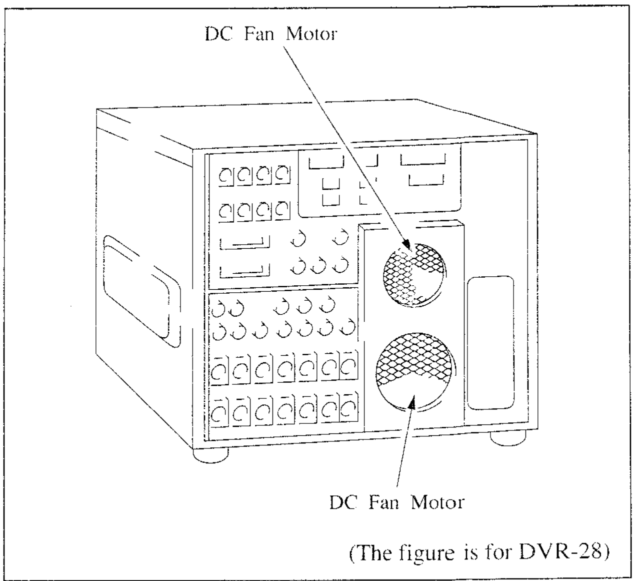


Fig. 5-2-10. DC Fan Motor

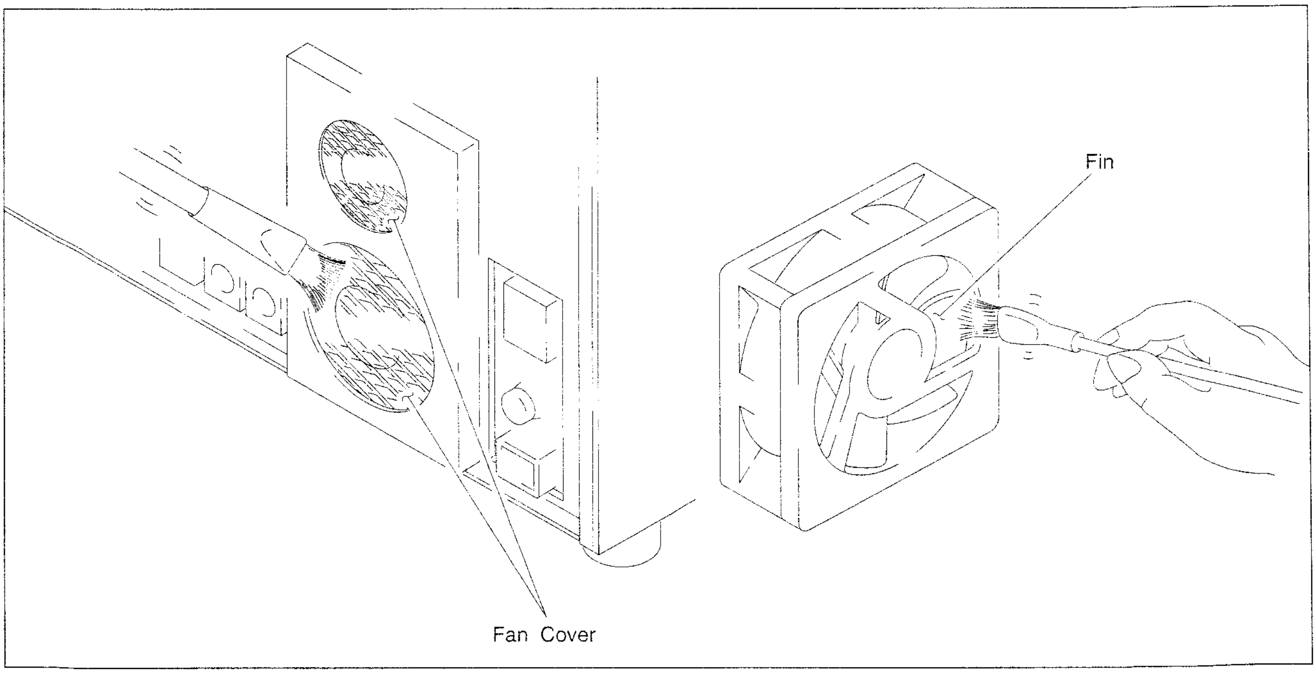


Fig. 5-2-11. Cleaning of DC Fan Motor

5-2-8. Cassette Compartment

Basic Knowledge

A. The Cassette Compartment moves in the direction of the cassette-down position when the wheel of the Cassette Compartment Ass'y shown in the figure is turned clockwise. The Cassette Compartment moves in the direction of the cassette-up position when it is turned counterclockwise. Move the compartment up and down, then clean it.

B. Prepare the following tool for cleaning:
- Cloth (or gauze)

Cleaning procedures

1. Absorb the dust on the compartment block from the cassette insertion inlet of the Cassette Compartment using a vacuum cleaner.
2. Clean the compartment block with dry cloth.

Note 1: Be careful not to apply an excessive force to the sun roof and compartment.

Note 2: Do not clean the sun roof and cassette compartment door with alcohol. This may cause a crack.

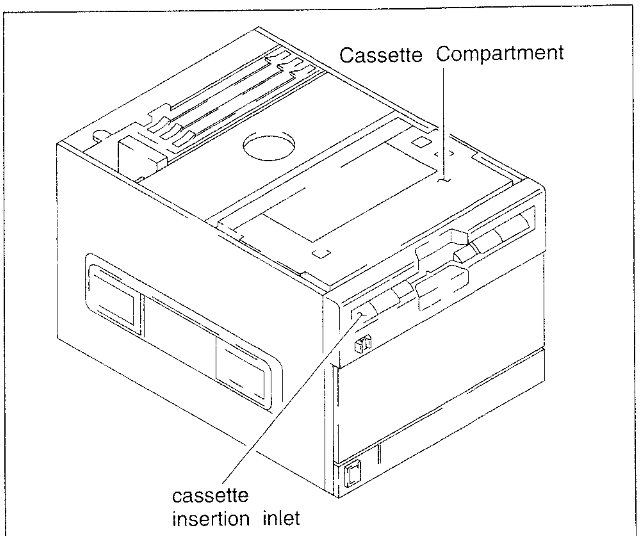

Cassette Compartment
cassette insertion inlet

Fig. 5-2-12. Cassette Insertion Inlet

Clean the Cassette Compartment every month.

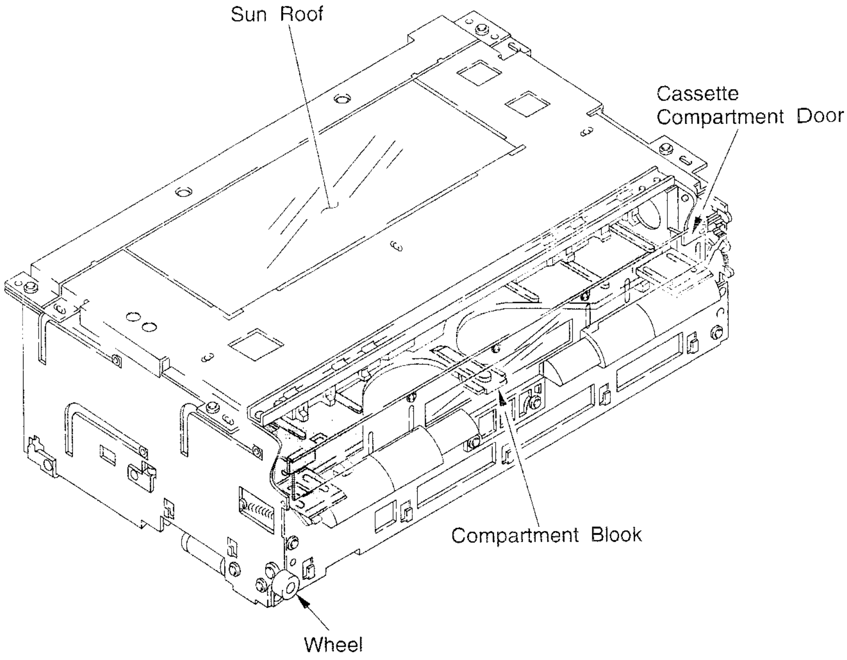

Sun Roof
Cassette Compartment Door
Compartment Blook
Wheel

Fig. 5-2-13. Cleaning of Cassette Compartment Ass'y

5-3. TRACKING CHECK

Basic Knowledge

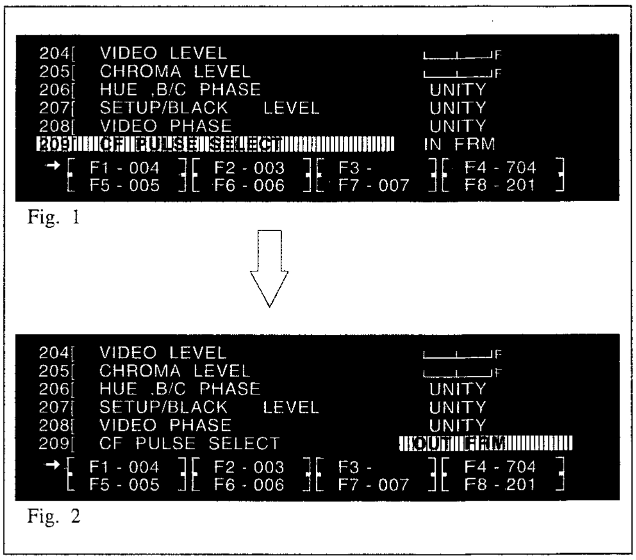
A. Prepare the following tool for the tracking check:
- Alignment Tape ER2-2 (NTSC)
  Sony Part No.: 8-960-071-12

B. When the Drum Ass'y or Inner Drum Ass'y is replaced, put the set into the REC mode and record a blank tape for about 20 minutes before this check.

BKDV-200 Series

Tracking check

1. Extract the signals below from the REC board.
   (1) Connect a probe (oscilloscope) to TP101 (REC CH-A OUT) on the REC board.
   (2) Connect the GND pin of an oscilloscope to the shielding case on the REC board.
   (3) Connect the CF PULSE OUT pin (BNC connector) on the connector panel as a trigger input.
2. Press the keys on the control panel in the order below.
   (1) Press the SHIFT + SET UP key to enter the Menu Mode.
   (2) Select 209. [CF PULSE SELECT] by pressing the SEARCH DIAL key or the ∨ key. (See Figure 5-3-1 and Figure 1.)
   (3) Press the > key to move the cursor to the right.
   (4) Select "OUT FRM" by pressing the ∧ key. (See Figure 5-3-1 and Figure 2.)
   (5) Press the < key to move the cursor to the left.
3. Insert an alignment tape and play back the CH-A recording signal (TC 15 to 20 min.) on the alignment tape.
4. Set "VTR" mode by pulling the TRACKING control knob.
5. Adjust the playback RF amplitude by turning the TRACKING control knob so that it rests at the maximum value.
6. Confirm that the RF waveform satisfies the specification. If not, make a tracking adjustment.
7. Push the TRACKING control knob to end the "VAR" mode.



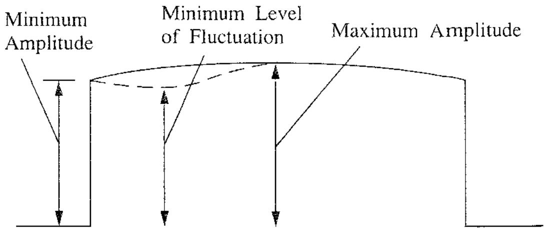
```
204[  VIDEO LEVEL                      ⌊__⌊__⌋F
205[  CHROMA LEVEL                     ⌊__⌊__⌋F
206[  HUE ,B/C PHASE                   UNITY
207[  SETUP/BLACK     LEVEL            UNITY
208[  VIDEO PHASE                      UNITY
209[  CF PULSE SELECT                  IN FRM
 →[ F1 - 004 ][ F2 - 003 ][ F3 -       ][ F4 - 704 ]
  [ F5 - 005 ][ F6 - 006 ][ F7 - 007 ][ F8 - 201 ]
```

Fig. 1

```
204[  VIDEO LEVEL                      ⌊__⌊__⌋F
205[  CHROMA LEVEL                     ⌊__⌊__⌋F
206[  HUE ,B/C PHASE                   UNITY
207[  SETUP/BLACK     LEVEL            UNITY
208[  VIDEO PHASE                      UNITY
209[  CF PULSE SELECT                  OUT FRM
 →[ F1 - 004 ][ F2 - 003 ][ F3 -       ][ F4 - 704 ]
  [ F5 - 005 ][ F6 - 006 ][ F7 - 007 ][ F8 - 201 ]
```

Fig. 2

Fig. 5-3-1. Indication on the Display in Tracking Check



Specification :

$$\frac{\text{Minimum amplitude or minimum level of fluctuation,which ever is smaller}}{\text{Maximum amplitude}} \times 100 \geqq 80\%$$

Fig. 5-3-2. Tracking Check

BKDV-101

> **Note:** The control panel (serial numbers 10001 through 17150) that is used in DVR-10 or DVR-18 cannot be used in the DVR-20 series. To use the control panel in the DVR-20 series, remodeling is required. For more information, consult your nearest service facility.

Tracking check

1. Extract the signals below from the REC board.
   (1) Connect a probe (oscilloscope) to TP101 (REC CH-A OUT) on the REC board.
   (2) Connect the GND pin of an oscilloscope to the shielding case on the REC board.
   (3) Connect the CF PULSE OUT pin (BNC connector) on the connector panel as a trigger input.
2. Press the keys on the control panel in the order below.
   [VIDEO OUT], [F11]
   The CF PULSE is set to "OUT FRM".
3. Insert an alignment tape and play back the CH-A recording signal (TC 15 to 20 min.) on the alignment tape.
4. Press the keys on the control panel in the order below.
   [TEST], [F5] (RF), [F4]
   The TRACKING is set to "VAR".
5. Turn the control knob on the control panel and adjust so that the playback RF amplitude is maximum.
6. Confirm that the RF waveform satisfies the specification. If not, perform the tracking adjustment.
7. Press the [F1] key to return to the "FIX" display.

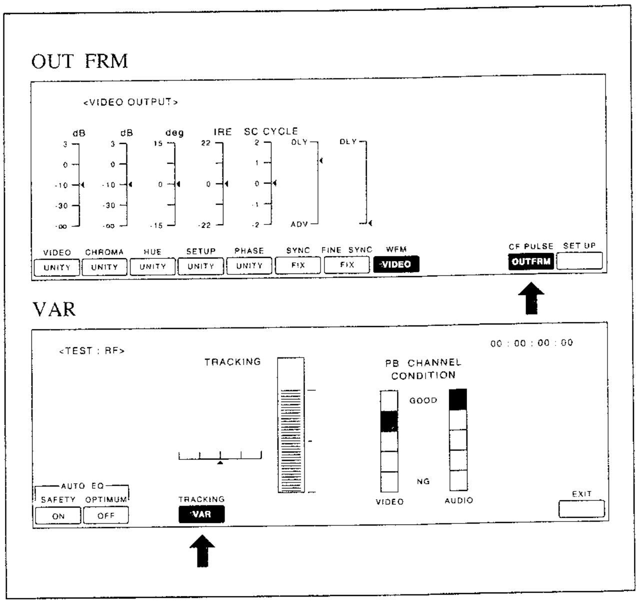
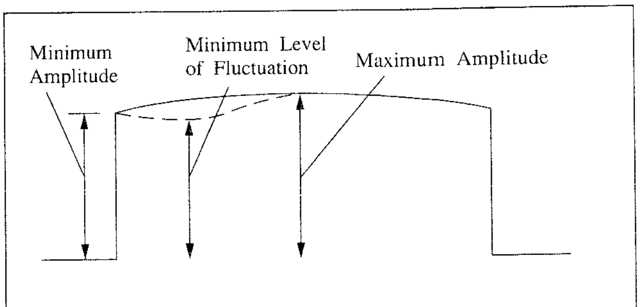

OUT FRM
<VIDEO OUTPUT>
dB
dB
deg
IRE
SC CYCLE
DLY
DLY
ADV
VIDEO
CHROMA
HUE
SETUP
PHASE
SYNC
FINE SYNC
WFM
UNITY
UNITY
UNITY
UNITY
UNITY
FIX
FIX
VIDEO
CF PULSE
SET UP
OUTFRM
VAR
<TEST : RF>
00 : 00 : 00 : 00
TRACKING
PB CHANNEL CONDITION
GOOD
NG
VIDEO
AUDIO
AUTO EQ
SAFETY
OPTIMUM
ON
OFF
TRACKING
VAR
EXIT

Fig. 5-3-3. Indication on the Display in Tracking Check


Minimum Amplitude
Minimum Level of Fluctuation
Maximum Amplitude

Specification :

$$\frac{\text{Minimum amplitude or minimum level of fluctuation,which ever is smaller}}{\text{Maximum amplitude}} \times 100 \geqq 80\%$$

Fig. 5-3-4. Tracking Check

5-4. HEAD PROJECTION CHECK

Basic Knowledge

A. Recording and playback can be performed if the projection of REC and PB head is more than 30 µm (NTSC) or 35 µm (PAL). Erasing can be performed if the projection of erase head is more than 10 µm.

B. Prepare the following tool for the measurement of head projection:
- Inner Drum Eccentricity Adjustment Tool DM-401
  Sony Part No.: J-6254-010-A

5-4-1. Inner Drum Eccentricity Adjustment Tool

Basic Knowledge

A. Confirm the item below before using this adjustment tool. This confirmation is required for the accurate adjustment or the protection of a tool and machine part.

1. Turn the probe of a tool downwards as shown in Fig. 5-4-2, hold it with a finger, and confirm that the probe smoothly falls when the finger is released. Clean the tool if the probe does not fall.

B. Prepare the following tools:
- Cleaning Piece
  Sony Part No.: 2-034-697-00
- Cleaning Fluid
  Sony Part No.: 9-919-573-00 or the equivalent

Cleaning procedures of inner drum eccentricity adjustment tool

(1) Turn the screw shown in Fig. 5-4-3 counterclockwise two or three times and remove the holder.
Note: Be careful not to lose the compression coil spring installed in the tool when the holder is removed.

(2) Remove the probe from the holder, then clean the probe and the circumference block of a holder's probe installing hole with cleaning piece moistened with cleaning fluid.

(3) Install the probe in the holder and move the probe back and forth four or five times.

(4) Install the holder in the tool.

2. Clean the head contact surface of the probe before measurement and confirm that there is no crack and stain on the surface.

Note: The crack and stain on the head contact surface causes an inaccurate measurement.
This may also damage the head. Replace the probe with a new one as soon as possible if a crack or stain occurs.

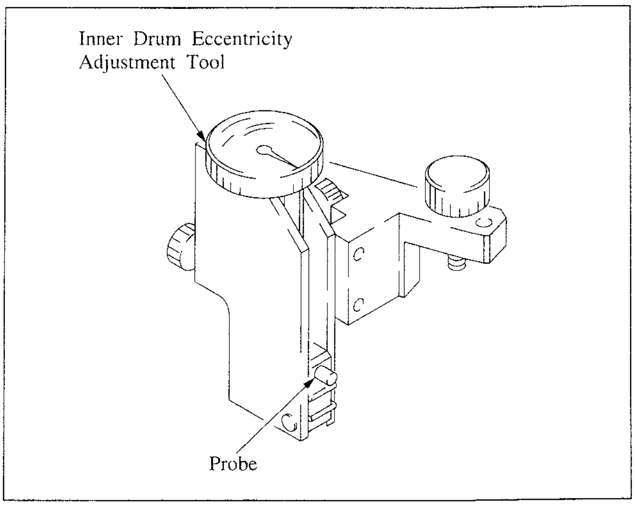


Fig. 5-4-1. Inner Drum Eccentricity Adjustment Tool

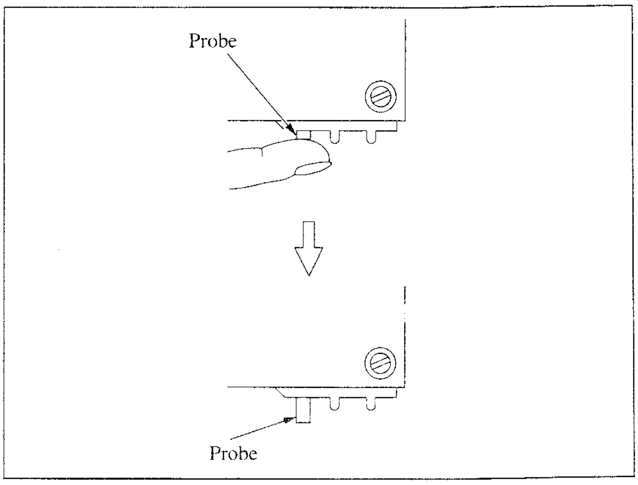


Fig. 5-4-2. Probe Check

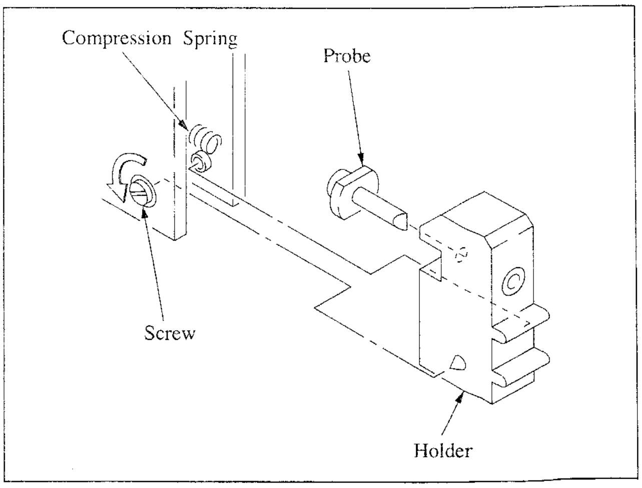


Fig. 5-4-3. Cleaning of Probe

5-4-2. Head Projection Check

1. Clean the head contact surface of a tool's probe and the Drum Ass'y before measurement.
   - Drum Ass'y cleaning: See sections 5-2-1 and 5-2-2.
   - Tool cleaning: See section 5-4-1.
2. Tool installation (Fig. 5-4-4)
   (1) Turn tool knob ① counterclockwise.
   (2) Move the dial gauge block of the tool in the direction indicated by arrow A and confirm that no clearance exists in the place shown in Fig. 1.
   (3) Move the dial gauge block in the direction indicated by arrow C while pulling knob ② in the direction of arrow B, then lock it.
   (4) Install the tool in the drum holder and tighten knob ③.

Note: Take care that the tool does not touch the rotary head when it is installed. Also, be careful not to damage the side surface of the drum.

   (5) Rotate the zero-point adjustment knob of the tool clockwise by one or two turns.
   (6) Turn the inner drum clockwise with a finger and stop it in the position where the probe of the tool does not touch the rotary head.
   (7) Hold the dial gauge block by hand and pull knob ② in the direction indicated by arrow B.
   (8) Move the dial gauge block gently in the direction indicated by arrow E so that it strikes against the side surface of the drum.

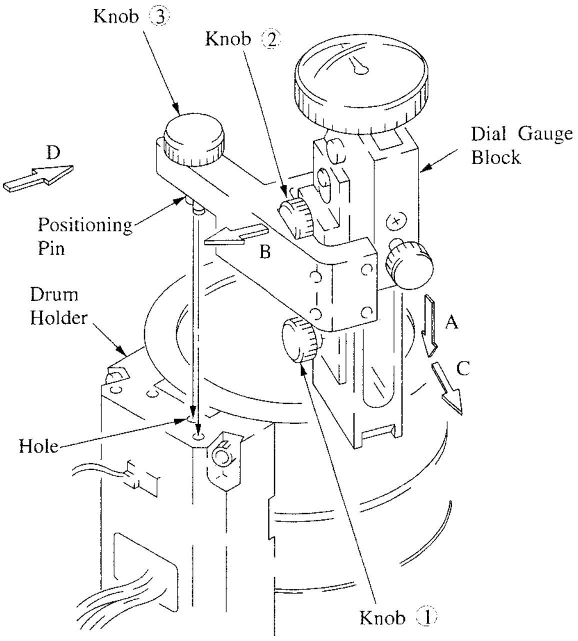
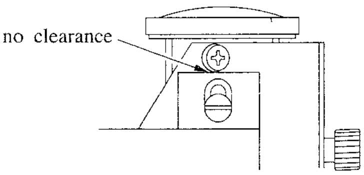

Knob ③
Knob ②
Dial Gauge Block
D
Positioning Pin
B
Drum Holder
A
C
Hole
Knob ①

Fig. 1
(viewing from D)


no clearance

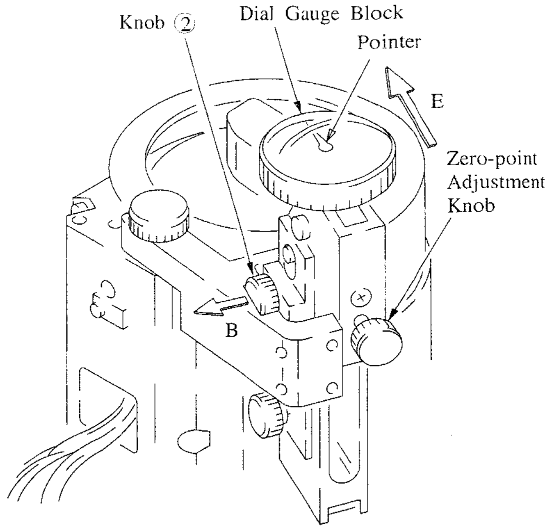

Knob ②
Dial Gauge Block
Pointer
E
Zero-point Adjustment Knob
B

Fig. 5-4-4. Installing of Inner Drum Eccentricity Adjustment Tool

3. Confirmation of tool and head contact surface (Fig. 5-4-5)
   (1) Confirm that two ribs touch the side surface of the lower drum as shown in the figure.
   (2) Turn the zero-point adjustment knob counterclockwise so that the probe strikes against the side surface of the lower drum.
   Confirm that the clearance between the probe and upper drum's lower edge shown in the figure satisfies the specification.

   Specification: 0.1 to 0.2 mm (when viewed visually)

   If the specification is not satisfied, repeat steps 2 and later.

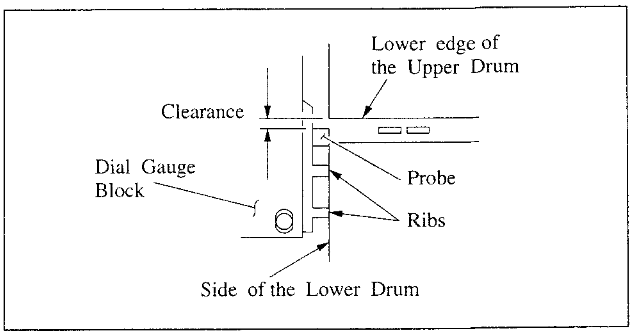

Lower edge of the Upper Drum
Clearance
Dial Gauge Block
Probe
Ribs
Side of the Lower Drum

Fig. 5-4-5. Confirmation of tool and head contact surface

4. Head projection check (Fig. 5-4-6)
   (1) Turn the dial gauge and adjust the pointer deflection to zero.
   (2) Rotate the inner drum slowly clockwise with a finger by one turn. If the pointer deflection does not return to zero, turn the dial gauge again and adjust the pointer to zero.

   Note: Do not turn the inner drum counterclockwise. This may damage the rotary head and probe.

   (3) Turn the inner drum slowly with a finger and measure the projection of REC or PB head.
   Confirm that the projection of REC or PB head is more than 30 µm (NTSC) or 35 µm (PAL).
   (Continue the measurement even if the pointer deflection does not return to zero during projection measurement.)

   Note: If the projection of REC or PB head is less than 30 µm (NTSC) or 35 µm (PAL), replace the Inner Drum Ass'y with a new one.

5. Remove the tool in the reverse order of step 2.

   Note: Remove the tool taking care that it does not touch the drum side surface and rotary head as when installed. Also, be careful not to damage them.

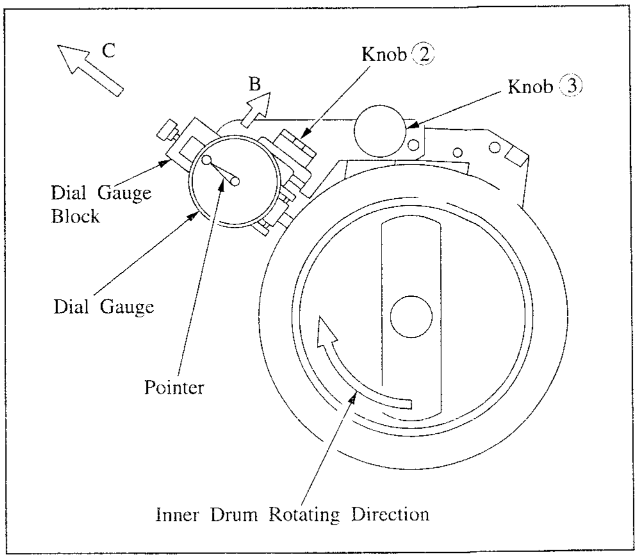

C
B
Knob ②
Knob ③
Dial Gauge Block
Dial Gauge
Pointer
Inner Drum Rotating Direction

Fig. 5-4-6. Head Projection Check

5-5. GREASE SMEARING AND LUBRICATION

Basic Knowledge

A. The grease smearing and lubrication must be performed during periodic check to fulfill the function and performance of a machine and to lengthen the life of a machine.

B. Lubricate the following places:
  - Cassette compartment block (Fig. 5-5-2)
  - TTP block (Figs. 5-5-3 and 5-5-4)

C. Prepare the following tools:
  - MOLYTONE Grease 30G (No. 1)
    Sony Part No.: 7-662-001-41
  - Oil (Mitsubishi diamond oil hydrofluid NT-68)
    Sony Part No.: 7-661-018-18 or the equivalent

D. Do not smear grease or oil to those except the specified place. Grease or oil scatters when a machine is activated. This may cause the trouble that the machine malfunctions or the tape cannot be used.

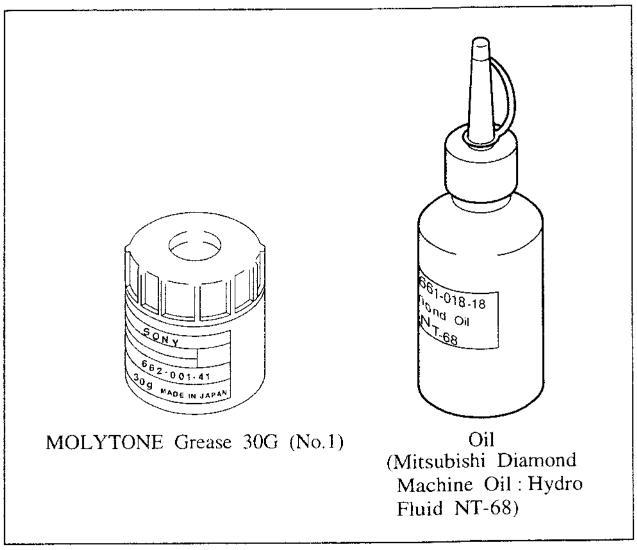

SONY
662-001-41
30g MADE IN JAPAN
61-018-18
ond Oil
NT-68
MOLYTONE Grease 30G (No.1)
Oil
(Mitsubishi Diamond
Machine Oil : Hydro
Fluid NT-68)

Fig. 5-5-1. MOLYTONE Grease and Oil

(1) Smear the MOLYTONE grease onto the portions marked with the arrows.
(three grooves each on the left and right sides)

(2) Smear the MOLYTONE grease onto the Gear 5s marked with the arrow.
(two Gear 5s each on the left and right sides)

(3) Smear the MOLYTONE grease onto the Cassette Compartment Worm Gears marked with the arrow of the inner motor and outer motor.

(4) Smear the MOLYTONE grease onto the Gear A-As marked with the arrow.
(two Gear A-As each on the left and right sides)

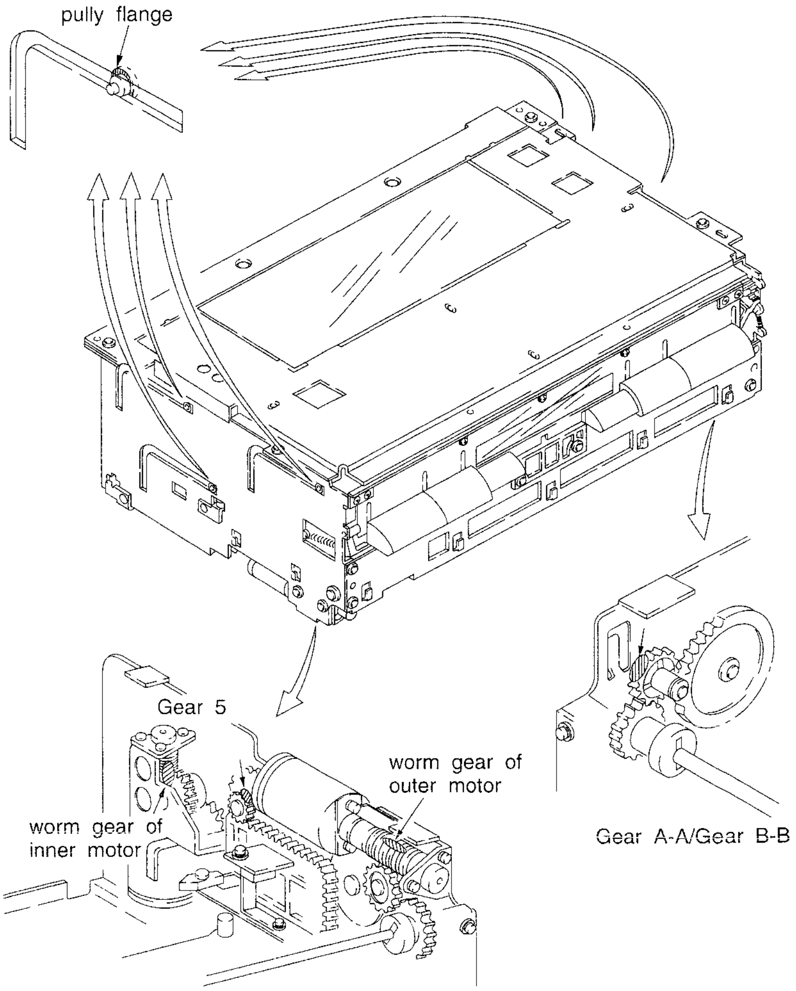
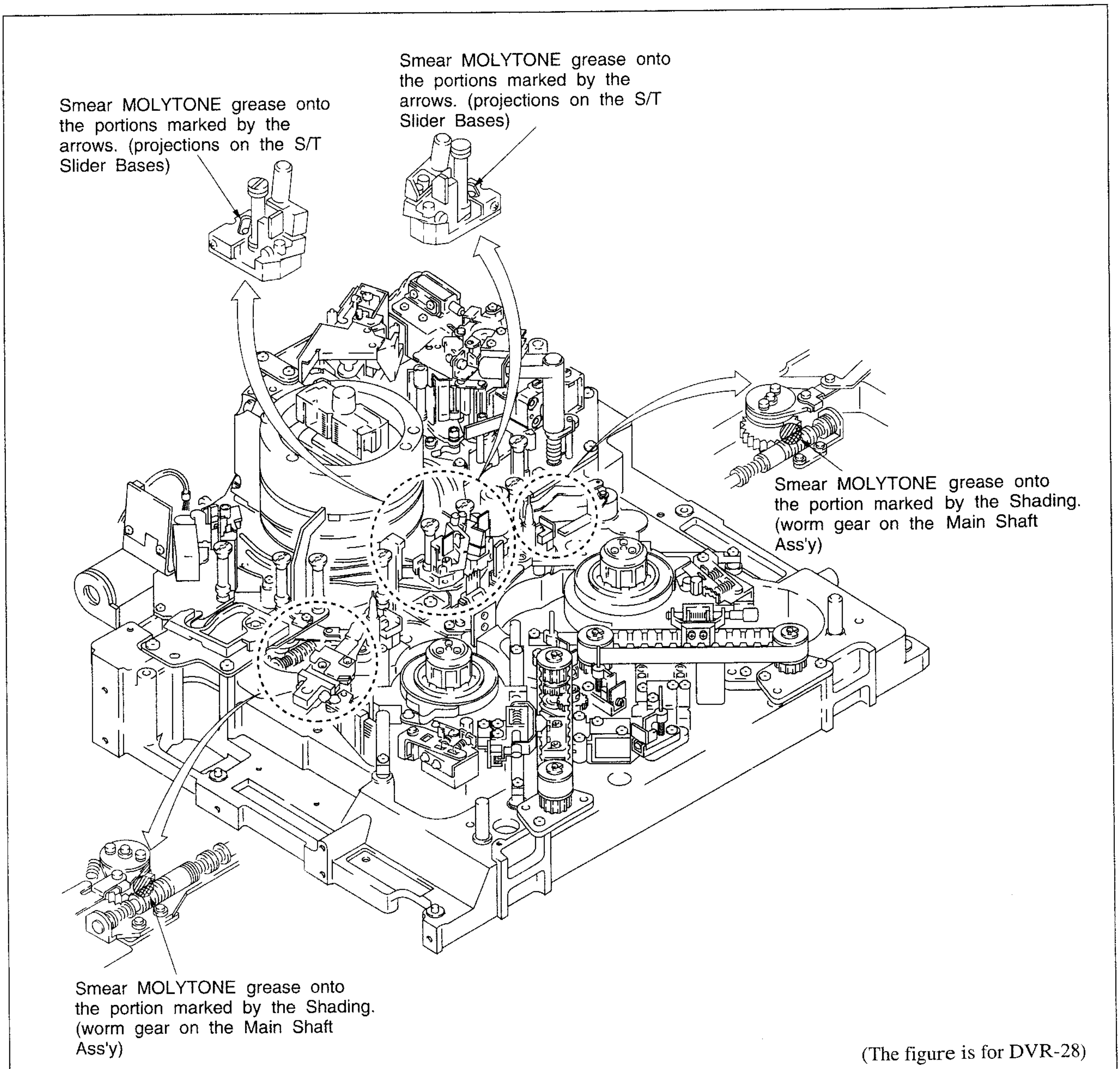

pully flange
Gear 5
worm gear of outer motor
worm gear of inner motor
Gear A-A/Gear B-B

Fig. 5-5-2. Grease Smearing of Cassette Compartment Block



Smear MOLYTONE grease onto the portions marked by the arrows. (projections on the S/T Slider Bases)

Smear MOLYTONE grease onto the portions marked by the arrows. (projections on the S/T Slider Bases)

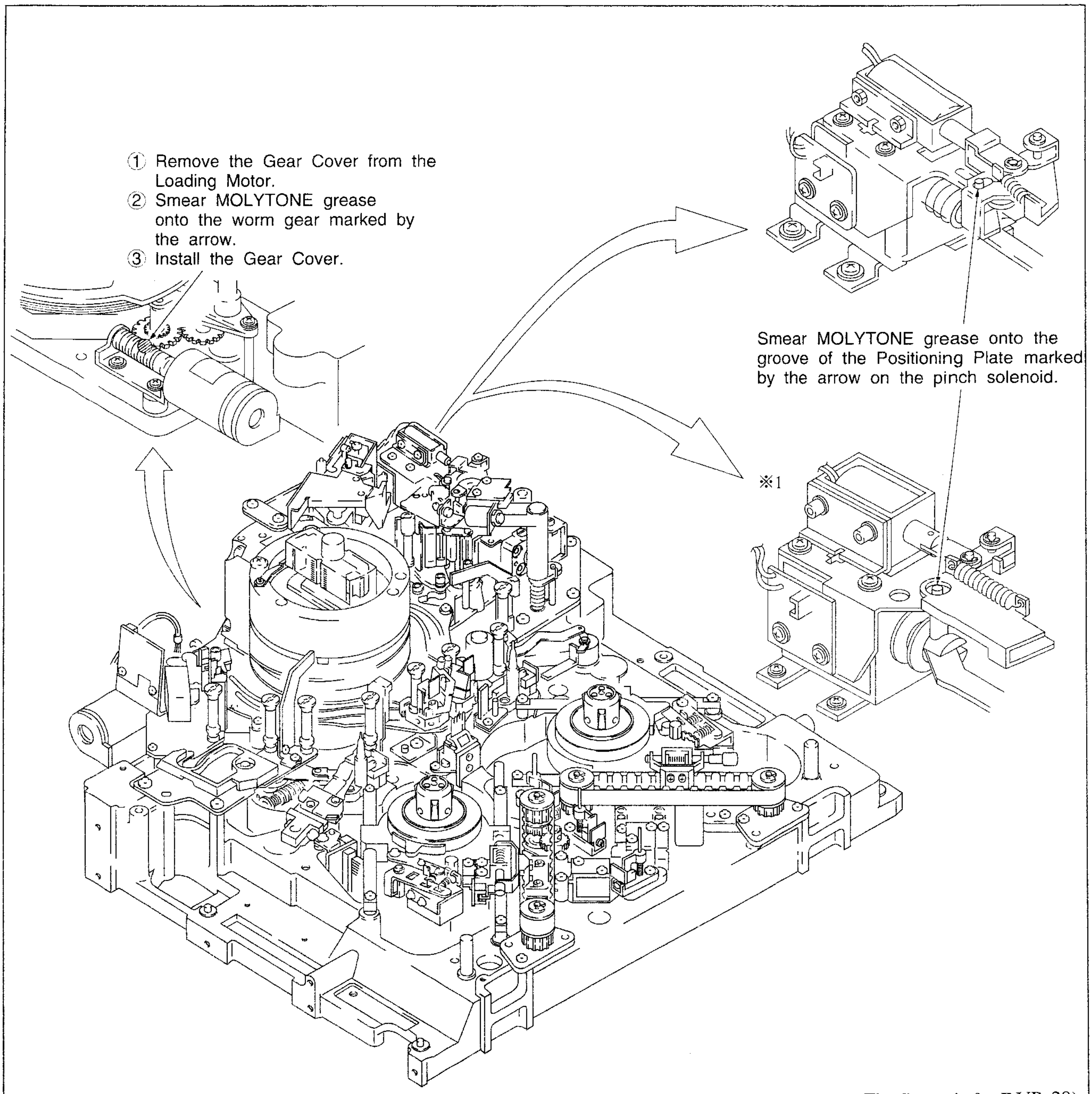
Smear MOLYTONE grease onto the portion marked by the Shading. (worm gear on the Main Shaft Ass'y)

Smear MOLYTONE grease onto the portion marked by the Shading. (worm gear on the Main Shaft Ass'y)

(The figure is for DVR-28)

Fig. 5-5-3. Grease Smearing and Lubrication of TTP Block (1)

Some part of the Pinch Plunger was changed on the following sets.
※1 : DVR-28 (UC) : S/N 12501 and higher
DVR-28P (UC) : S/N 11903 and higher
DVR-28P (EK) : S/N 12001 and higher
DVR-P28 (UC) : S/N 10401 and higher



① Remove the Gear Cover from the Loading Motor.
② Smear MOLYTONE grease onto the worm gear marked by the arrow.
③ Install the Gear Cover.

Smear MOLYTONE grease onto the groove of the Positioning Plate marked by the arrow on the pinch solenoid.

(The figure is for DVR-28)

Fig. 5-5-4. Grease Smearing and Lubrication of TTP Block (2)

SECTION 6
PART REPLACEMENT

6-(1). GENERAL INFORMATION FOR PART REPLACEMENT

The procedures of the part replacement vary with the serial numbers of the units.
The details of *1, *2, *3 and *4 marks are following.

Applicable Serial Numbers

*1:	DVR-28 (UC)	S/N	10001 through 11999
	DVR-28P (UC)	S/N	10001 through 11199
	DVR-28P (EK)	S/N	10001 through 11699
*2:	DVR-28 (UC)	S/N	12001 and higher
	DVR-28P (UC)	S/N	11201 and higher
	DVR-28P (EK)	S/N	11701 and higher
*3:	DVR-28 (UC)	S/N	12101 and higher
	DVR-28P (UC)	S/N	11201 and higher
	DVR-28P (EK)	S/N	11701 and higher
*4:	DVR-28 (UC)	S/N	12201 and higher
	DVR-28P (UC)	S/N	11201 and higher
	DVR-28P (EK)	S/N	11801 and higher

6-(1)-1. Preparation before Part Replacement

1. Replace the tape transport (TTP) part in accordance with the procedure below:
   (1) Turn the power off.
   (2) Remove the top panel.
   (For removal, refer to Section 2.)
   (3) Remove the Cassette Compartment.
   Refer to section 6-2, "Replacement of Cassette Compartment Ass'y".

6-(1)-2. Use of Tool

1. Caution before use
   Clean the surface of the tool used for mechanical adjustment with cleaning fluid before use. Confirm that no oily component is left on the tool surface during tape transport path adjustment.
   - Cleaning fluid (or the equivalent)
     Sony part No.: 9-919-573-00

2. Tool storage
   Clean the surface of the tool with cleaning fluid after use. After that, smear rustresistant oil slightly to it, then store.
   - Oil
     Sony part No.: 7-661-018-18

3. Flaw in tool
   Remove the convex portion of the flawed surface using an oilstone (with finer particle). No accurate adjustment can be performed if a tool is used with the convex portion left. Be careful not to damage the tool.

4. Screw tightened torque
   Except for the special designation, the following value is standard.

Screw Diameter	Tightened Torque
M 2	19.6×10^{-2} N·m (2 kgf·cm)
M 2.6	58.8×10^{-2} N·m (6 kgf·cm)
M 3	74.4×10^{-2} N·m (8 kgf·cm)
M 4	137.2×10^{-2} N·m (14 kgf·cm)

6-(1)-3. How to Enter Threading End/Unthreading End State by Manual Operation

1. Threading end state
   Turn the worm gear of the loading motor shown in Fig. 6-1 in the direction indicated by arrow A.

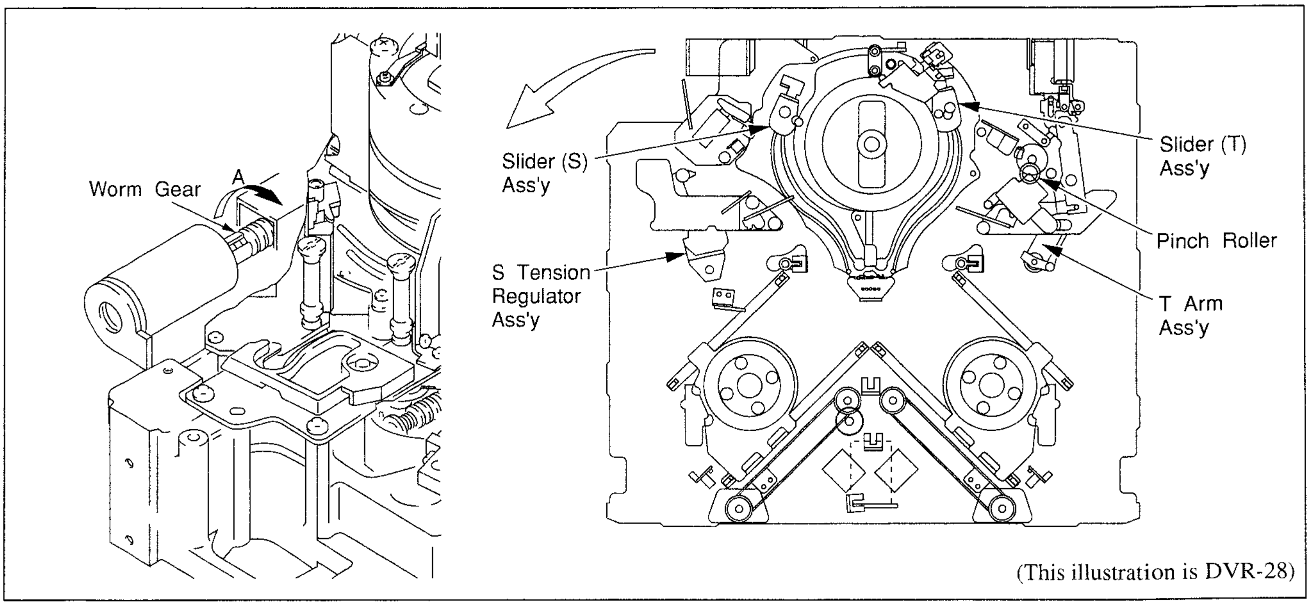

Worm Gear
A
Slider (S) Ass'y
S Tension Regulator Ass'y
Slider (T) Ass'y
Pinch Roller
T Arm Ass'y
(This illustration is DVR-28)

Fig.6-(1)-1 How To Enter Threading End State by Manual Operation

2. Unthreading end state
   Turn the worm gear of the loading motor in the direction indicated by arrow B.

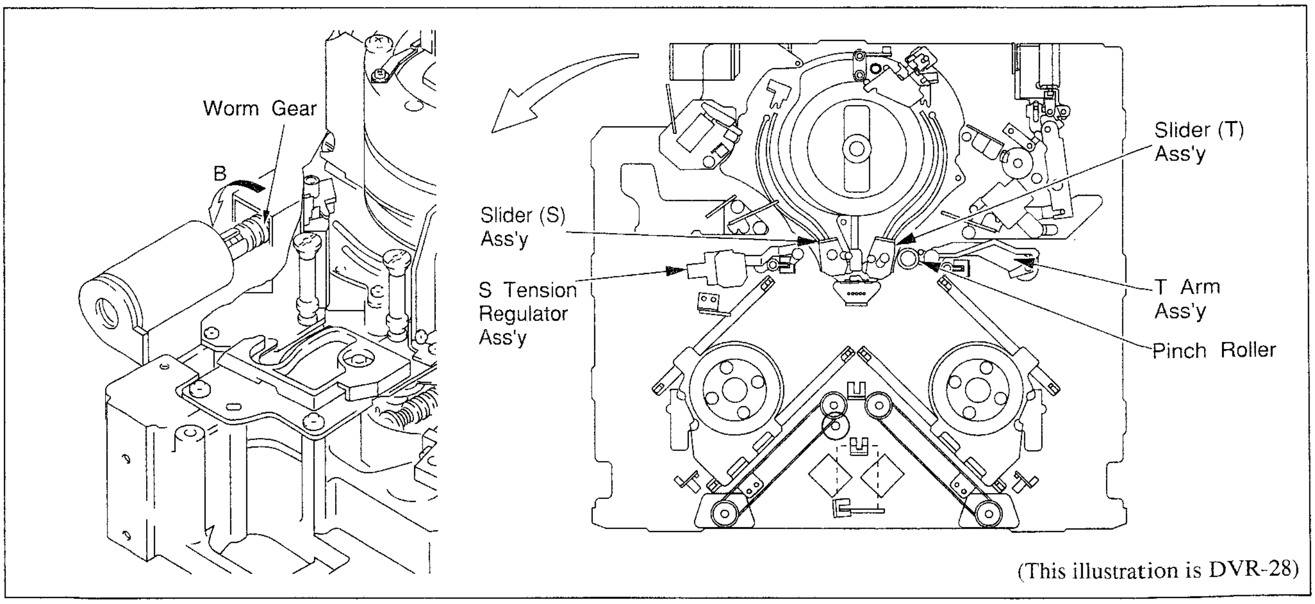

Worm Gear
B
Slider (S) Ass'y
S Tension Regulator Ass'y
Slider (T) Ass'y
T Arm Ass'y
Pinch Roller
(This illustration is DVR-28)

Fig.6-(1)-2 How To Enter Unthreading End State by Manual Operation

6-(1)-4. Monitor Select Key Operation

A monitor select key of BKDV-200 series control panel is used for input the command, data and so on, in CHECKER mode of TEST menu.
For the key operation, this is shown as follows in this manual.

ex.) Entry F28 in CHECKER MODE.

BKDV-200/201/202 : sheet plane display of the monitor select key
For BKDV-200/201, both the standard and
supplied accessories are applicable.

INPUT CHECK + 5 (F) , 2 , 8 , SET

input alphabet

Equal to ALPHA SET key
(For BKDV-202, LOCAL/REMOTE)

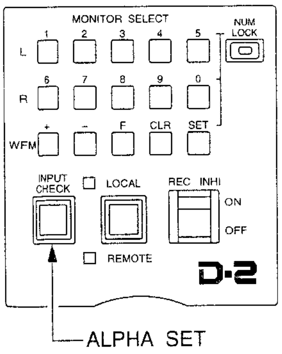
The numeric character and its corresponding alphabetic character are shown in the table below.

Numeral ↔ alphabet to correspondence chart

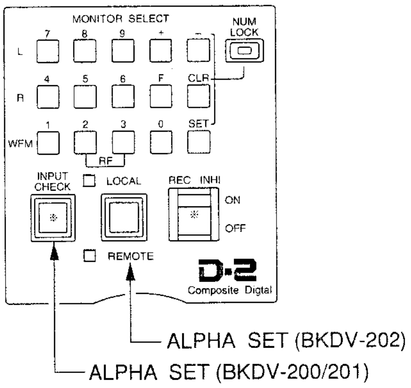
1	2	3	4	5	6	7	8	9	0
B	C	D	E	F					A

SET : Used when entering a command or data.
+ : Used as a space key.(Advances to the next address for $ and $$ commands.)
− : Delete one character before the cursor. (Return to the previous address for $ and $$ commands.)
CLR : Not operate.

Monitor Select Key Sheet

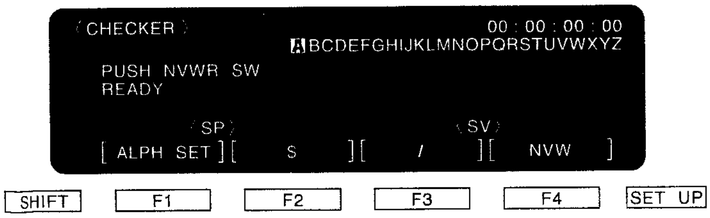

MONITOR SELECT
NUM LOCK
1 2 3 4 5
L
6 7 8 9 0
R
+ − F CLR SET
WFM
INPUT CHECK
LOCAL
REC INHI
ON
OFF
REMOTE
D-2
ALPHA SET

BKDV-200/201 standard


MONITOR SELECT
NUM LOCK
7 8 9 + −
L
4 5 6 F CLR
R
1 2 3 0 SET
WFM
RF
INPUT CHECK
LOCAL
REC INHI
ON
OFF
REMOTE
D-2
Composite Digital
ALPHA SET (BKDV-202)
ALPHA SET (BKDV-200/201)

BKDV-200/201 supplied accessories
BKDV-202 (not have ※ -mark key)

Note: The alphabet can be input using the second-line alphabets on the display.
ex.) To select "A"...............Select A using the search dial, and press F1 key.



```
<CHECKER>                          00 : 00 : 00 : 00
                         ABCDEFGHIJKLMNOPQRSTUVWXYZ
  PUSH NVWR SW
  READY

        <SP>                       <SV>
  [ ALPH SET ][     S     ][     /     ][    NVW     ]
```

SHIFT
F1
F2
F3
F4
SET UP

6-1. INNER DRUM ASS'Y REPLACEMENT

6-1-1. Inner Drum Ass'y Replacement

Basic Knowledge

A. It is necessary to perform the Inner Drum Ass'y replacement in case of the following conditions:

(1) When the head projection of the rotary head reaches the life due to wearing (when the head projection is less than 30 μm (NTSC)/35 μm (PAL) in the REC/PB head only <The DVR-P28 does not have the REC head>).

(2) When the RF waveform cannot be obtained to the specified waveform even if the tracking adjustment is performed.

B. The following parts are supplied with the Inner Drum Ass'y for repair parts. These parts are used for adjustment after replacement. Be careful not to lose them.

- Rec Current Adjustment Cable (Not used for DVR-P28)
- Upper Drum Position Confirm Spacer
- Inner Drum Seal

C. There was some difference in the replacement procedures because some part of the Inner Drum Ass'y was changed on the following sets.

DVR-28 (UC) : S/N 12501 and higher
DVR-28P (UC) : S/N 12101 and higher
DVR-28P (EK) : S/N 12001 and higher
DVR-P28 (UC) : S/N 10401 and higher

D. Prepare the following tools for replacement and adjustment:

- Inner Drum Eccentricity Adjustment Tool
  Sony Part No.: J-6254-010-A
- Upper Drum Attachment (A) Tool
  Sony Part No.: J-6257-400-A
- Upper Drum Hexagonal Driver (for drum)
  Sony Part No.: J-6254-700-A
- Cleaning Piece
  Sony Part No.: 2-034-697-00
- Hexagon Wrench Driver
  Sony Part No.: J-6153-970-A (Across flat has 1.5 mm)
  7-700-766-03 (Across flat has 2.0 mm)
  7-700-766-04 (Across flat has 2.5 mm)
- Ratchet Wrench (Across flat has 3 mm)
  Sony Part No.: J-6254-660-A
- Cleaning Fluid (or the equivalent)

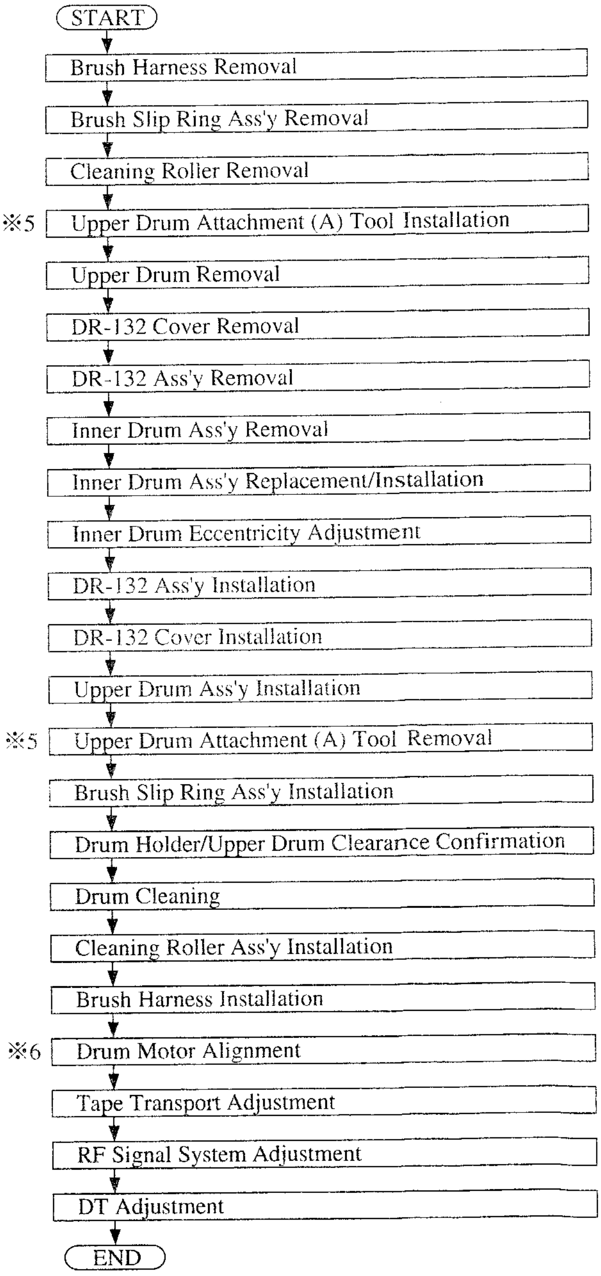
E. Flowchart for the replacement . There are not the steps with ※5 marks on the following sets.

DVR-28 (UC) : S/N 12501 and higher
DVR-28P (UC) : S/N 12101 and higher
DVR-28P (EK) : S/N 12001 and higher
DVR-P28 (UC) : S/N 10401 and higher

Note: If the new Inner Drum Ass'y is installed to the following sets, carry out the Drum Motor alignment with ※6.

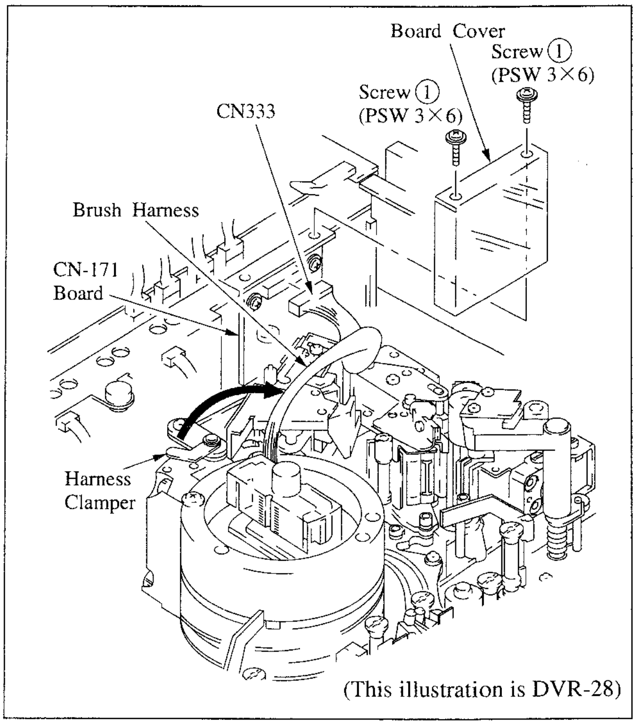
DVR-28 (UC) : S/N 10001 through 12500
DVR-28P (UC) : S/N 10001 through 12100
DVR-28P (EK) : S/N 10001 through 12000
DVR-P28 (UC) : S/N 10001 through 10400

- Inner Drum Ass'y
  Sony Part No. : A-6052-138-B (DVR-28)
  A-6052-139-B (DVR-28P)
  A-8260-328-B (DVR-P28)


START
Brush Harness Removal
Brush Slip Ring Ass'y Removal
Cleaning Roller Removal
※5
Upper Drum Attachment (A) Tool Installation
Upper Drum Removal
DR-132 Cover Removal
DR-132 Ass'y Removal
Inner Drum Ass'y Removal
Inner Drum Ass'y Replacement/Installation
Inner Drum Eccentricity Adjustment
DR-132 Ass'y Installation
DR-132 Cover Installation
Upper Drum Ass'y Installation
※5
Upper Drum Attachment (A) Tool Removal
Brush Slip Ring Ass'y Installation
Drum Holder/Upper Drum Clearance Confirmation
Drum Cleaning
Cleaning Roller Ass'y Installation
Brush Harness Installation
※6
Drum Motor Alignment
Tape Transport Adjustment
RF Signal System Adjustment
DT Adjustment
END

Replacement

1. Brush harness removal (Fig. 6-1-1)
   (1) Remove the brush harness from the harness clamper.
   (2) Remove two of screw ①, then remove the board cover. Pull out connector CN333 from the CN-171 board and remove the brush harness.


Board Cover
Screw ①
(PSW 3×6)
Screw ①
(PSW 3×6)
CN333
Brush Harness
CN-171
Board
Harness
Clamper

(This illustration is DVR-28)

Fig. 6-1-1 Brush Harness Removal

2. Brush Slip Ring Ass'y removal (Fig. 6-1-2)
   (1) Turn and remove the Brush Slip Ring Ass'y in the direction indicated by arrow A while raising the SR stopper by hand.
   (2) Loosen two of screw ② fully, and remove the Brush Slip Ring Ass'y.

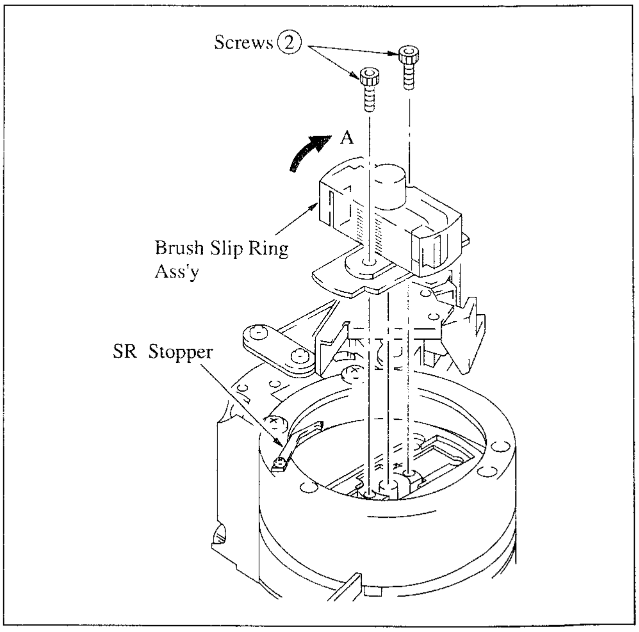

Screws ②
A
Brush Slip Ring
Ass'y
SR Stopper

Fig. 6-1-2 Brush Slip Ring Ass'y Removal

3. Cleaning Roller Ass'y removal (Fig. 6-1-3)
   (1) Remove two of screw ③ , then remove the Cleaning Roller Ass'y from the drum holder.
   (2) Remove connector CN802 from the CN-309 board of the Cleaning Roller Ass'y.

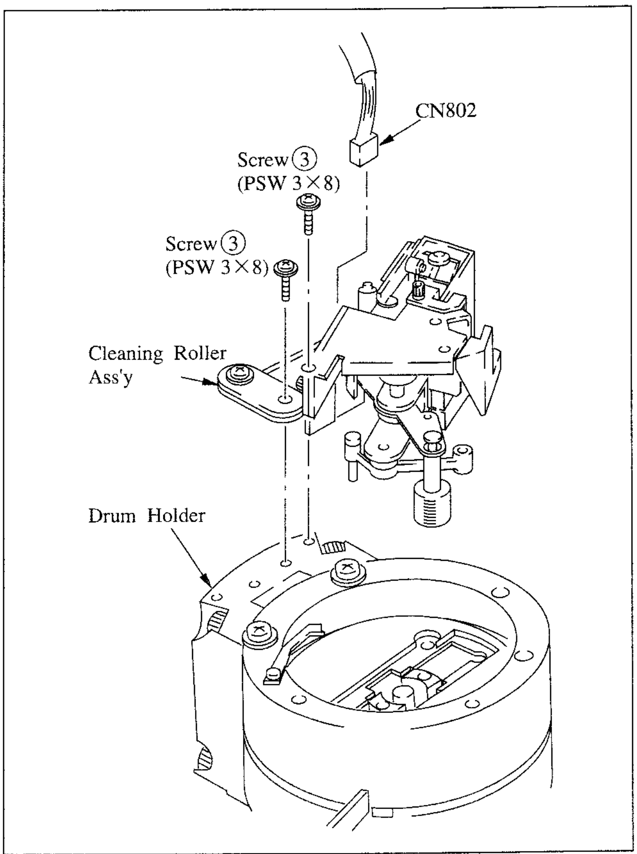

CN802
Screw③
(PSW 3×8)
Screw③
(PSW 3×8)
Cleaning Roller
Ass'y
Drum Holder

Fig. 6-1-3 Cleaning Roller Ass'y Removal

Carry out the steps on and after page 6-4 (a) except the following sets.

DVR-28 (UC) : S/N 10001 through 12500	DVR-28P (EK) : S/N 10001 through 12000
DVR-28P (UC) : S/N 10001 through 12100	DVR-P28 (UC) : S/N 10001 through 10400

4. Upper drum attachment (A) tool installation (Fig. 6-1-4)
   This tool is used to prevent the possible damage of a rotary head when the upper drum is installed or removed.
   Use the tool during upper drum installation or removal.
   (1) Turn the Inner Drum Ass'y with a finger and align hole A of the upper drum with hole B of the Inner Drum Ass'y. (Fig. 1)
   (The screw of the lower drum can be seen through hole B when hole A is viewed from just above.)
   (2) Insert the disk stopper pin into hole A until it is inserted into the lower drum mounting screw. (Fig. 1)
   (3) Install the upper drum spacer in the Drum Ass'y. (Fig. 2)
   (4) Install the cap in the disk stopper pin, screw it, and fix the upper drum spacer. (Fig. 3)

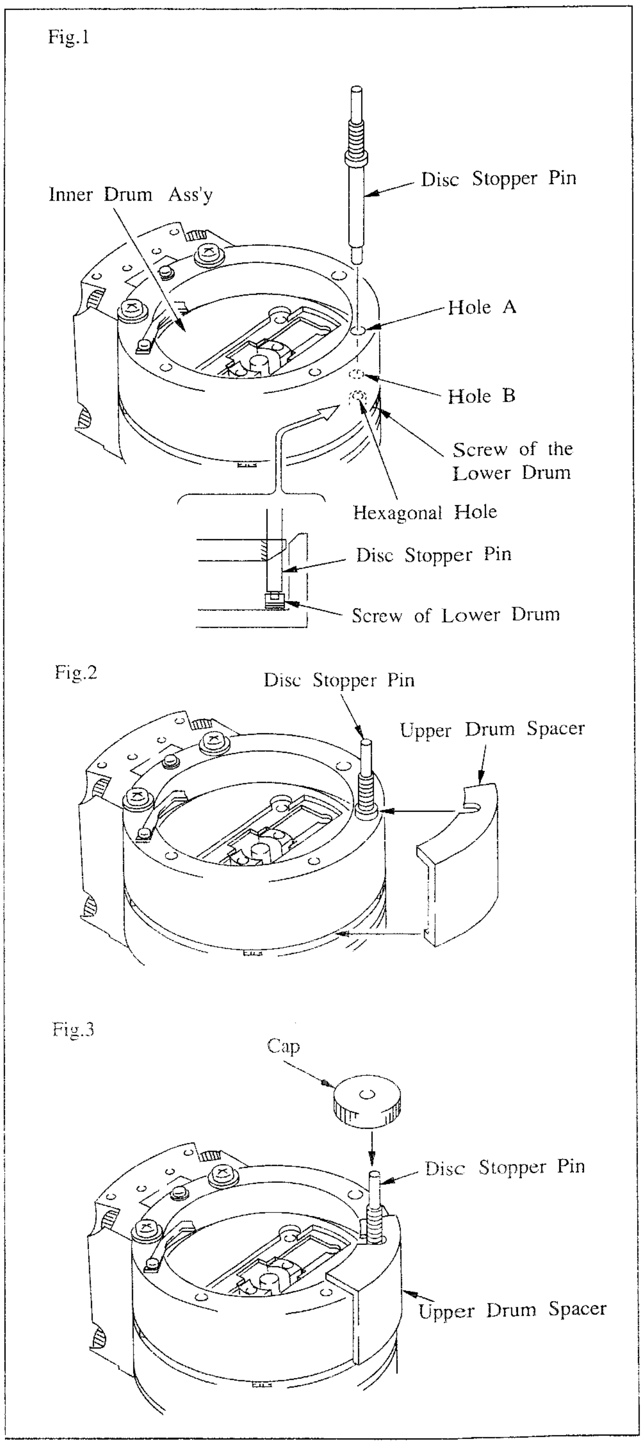


Fig.1
Inner Drum Ass'y
Disc Stopper Pin
Hole A
Hole B
Screw of the Lower Drum
Hexagonal Hole
Disc Stopper Pin
Screw of Lower Drum
Fig.2
Disc Stopper Pin
Upper Drum Spacer
Fig.3
Cap
Disc Stopper Pin
Upper Drum Spacer

Fig. 6-1-4 Upper Drum Attachment (A) Tool Installation

5. Upper drum Ass'y removal (Fig. 6-1-5)
   (1) Loosen the two screws ④ using a Rachet Wrench.
   (2) Replace a Rachet Wrench with a Upper Drum Hexagonal Driver. Remove the two screws④ and remove the Upper Drum.

   Note1: Do not remove the upper drum attachment (A) tool. Use it during installation.

   Note2: When removing the two screws ④, remove the Upper Drum while pushing the A portion of the Upper Drum in the direction of arrow A.

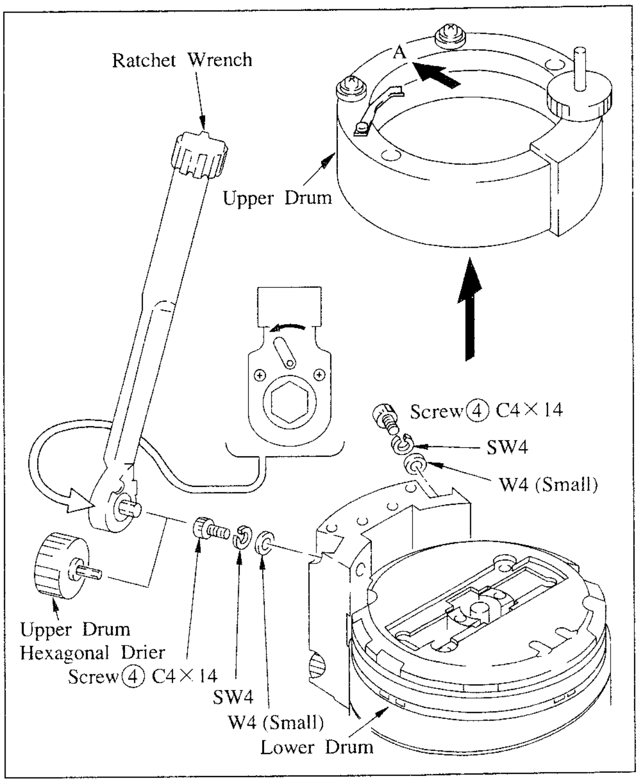

Ratchet Wrench
A
Upper Drum
Screw④ C4×14
SW4
W4 (Small)
Upper Drum
Hexagonal Drier
Screw④ C4×14
SW4
W4 (Small)
Lower Drum

Fig. 6-1-5 **Upper Drum Ass'y Removal**

6. DR-132 cover removal (Fig. 6-1-6)
   Remove two of screw ⑤ of DR-132 cover displays "5" and "6", then remove the DR-132 cover.

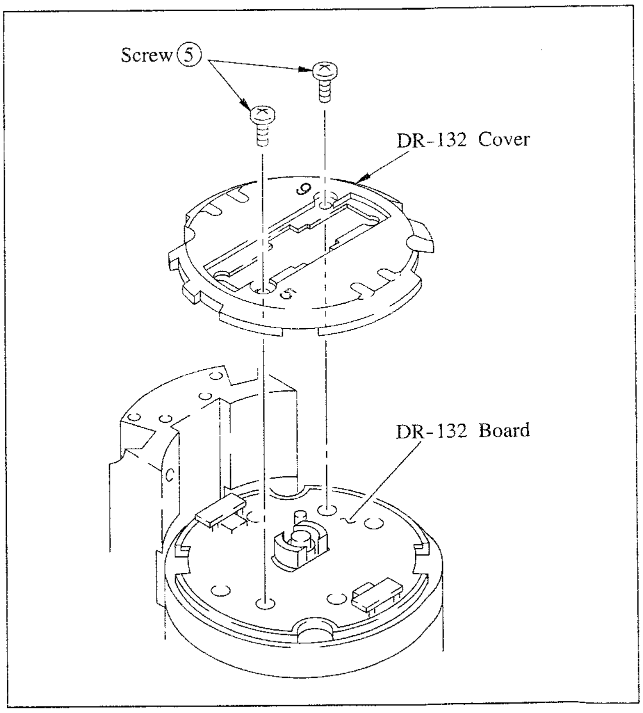

Screw⑤
DR-132 Cover
6
5
DR-132 Board

Fig. 6-1-6 **DR-132 Cover Removal**

7. DR-132 Ass'y removal (Fig. 6-1-7)
   (1) Extract the two DR-175 boards installed in the DR-132 board taking care that no force is applied to the harness.
   (2) Remove four of screw ⑥ , then remove the DR-132 Ass'y from the Inner Drum Ass'y.

   Note: Remove the DR-132 Ass'y taking care not to damage the previously removed DR-175 board.

In this stage, only the component parts of the DR-132 Ass'y can be replaced. Perform steps 11 and later when the DR-132 Ass'y is replaced.

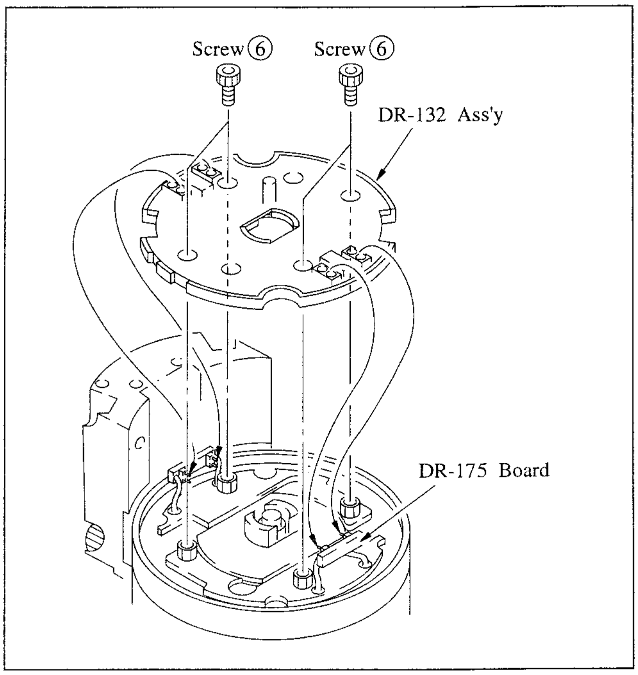


Fig. 6-1-7 DR-132 Ass'y Removal

Head cover installation (Fig. 6-1-8)

The head cover is used to prevent the possible damage of a rotary head when the Inner Drum Ass'y is replaced.

- The head cover is installed in advance in the Inner Drum Ass'y for replacement.
- The installation of the head cover is not required when a disused Inner Drum Ass'y is removed. If you do not wish to damage the rotary head, install the head cover in the Inner Drum Ass'y.

(1) Insert the DR-175 board into the DR-135 board.
(2) Turn the Inner Drum Ass'y with a finger and align the "PLAY A B" indication on the DR-135 board with the position shown in the figure.
(3) Align the head cover with the "PLAY A B" indication on the DR-135 board and install the head cover with four of screw ⑥

8. Inner Drum Ass'y removal
   (1) Turn the Inner Drum Ass'y with a finger and align the "PLAY A B" indication on the DR-135 board with the position shown in the figure.
   (2) Align the "PLAY A B" indication on the DR-135 board with the circumference indication of the head cover and put the head cover on the Inner Drum Ass'y.
   (3) Install the head cover with four screws ⑥ .

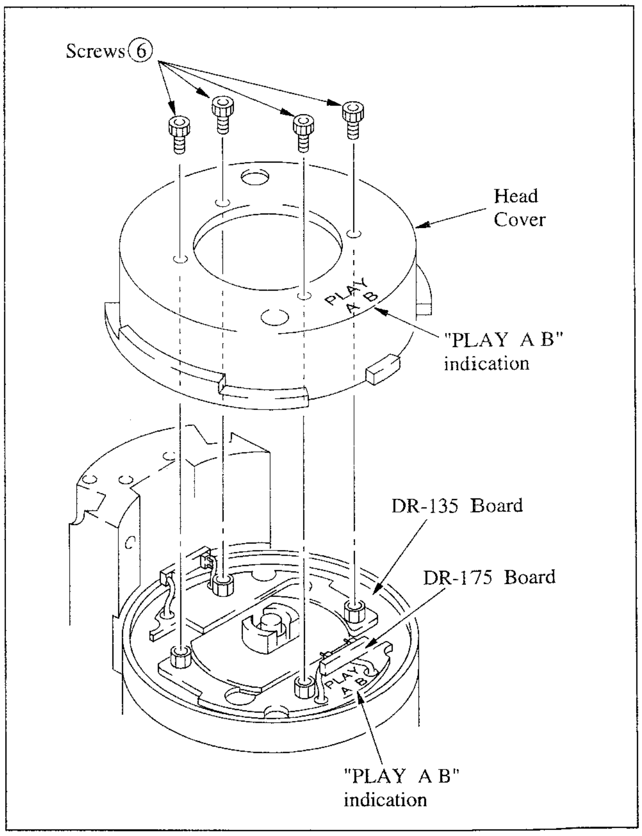


Fig. 6-1-8 Head Cover Installation

(4) Remove two of screw ⑦ from the holes of the head cover shown in the figure.

(5) Raise the Inner Drum Ass'y (with cover) upward, then remove.

9. Inner Drum Ass'y replacement/installation

(1) The Inner Drum Ass'y for repair parts has a head cover. Adjust the PLAY A B indication position and install the Inner Drum Ass'y in the Lower Drum Ass'y with two of screw ⑦. Remove four of screw ⑥ , then remove the head cover.

(2) Install the head cover in the Inner Drum Ass'y in which no head cover is installed referring to step 8. Then, install the Lower Drum Ass'y as in step (1).

(3) Stick a new inner durm seal supplied with the Inner Drum Ass'y for repair over the old inner drum seal.

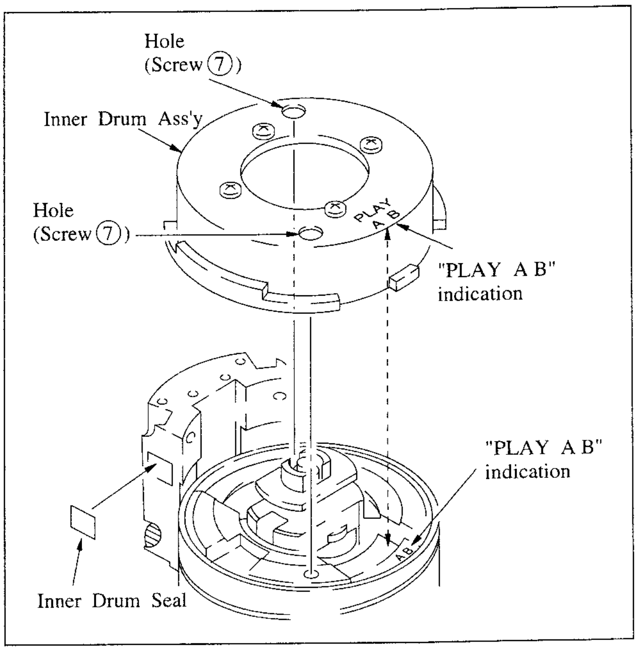

Hole
(Screw ⑦)
Inner Drum Ass'y
Hole
(Screw ⑦)
PLAY A B
"PLAY A B" indication
"PLAY A B" indication
AB
Inner Drum Seal

Fig. 6-1-9 Inner Drum Ass'y Replacement

10. Inner drum eccentricity adjustment
Refer to section 6-1-2.

11. DR-132 Ass'y Installation

(1) Remove two DR-175 boards from the DR-135 board.

(2) Install the DR-132 Ass'y in the Inner Drum Ass'y with four screws ⑥.

(3) Remove two DR-175 boards into the DR-132 board.
(Refer to Fig. 6-1-7.)

12. DR-132 cover installation
Install the DR-132 cover in the Inner Drum Ass'y with two screws ⑤. (Refer to Fig. 6-1-6.)

Note1: Check that the two matching resistors (blue color) were inclined in the direction of arrow A. If the two matching resistors were not inclined, incline them as shown in Fig. 6-1-9 (a).

Note2: Move the XY harness (black/yellow color) of the DR-175 Board in the direction of arrow A so as not to put the XY harness on the DR-132 Shield.
(Fig. 6-1-9 (b))

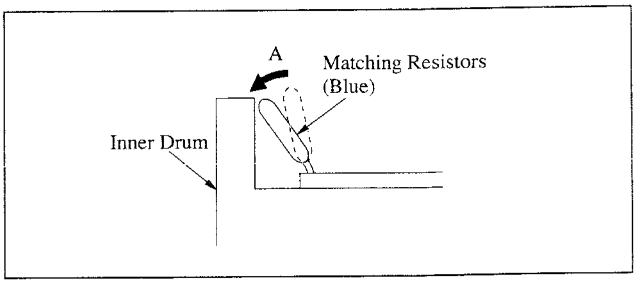

A
Matching Resistors
(Blue)
Inner Drum

Fig. 6-1-9 (a) DR-132 Cover Installation (1)

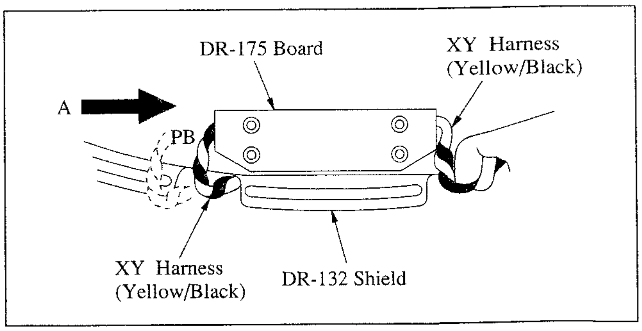

DR-175 Board
XY Harness
(Yellow/Black)
A
PB
XY Harness
(Yellow/Black)
DR-132 Shield

Fig. 6-1-9 (b) DR-132 Cover Installation (2)

13. Upper Drum Ass'y Installation (Fig. 6-1-10)
    (1) Clean the drum holder and upper drum's fixing surface with cleaning piece moistened with cleaning fluid. After cleaning, wipe it with dry cloth two or three times.
    (2) Return the Inner Drum Ass'y with a finger and stop it in the position where the screw of the lower drum can be viewed from hole B of the Inner Drum Ass'y.
    (3) Insert the disc stopper pin of the upper drum (in which a upper drum attachment (A) tool is installed) into hole B of the Inner Drum Ass'y from just above and install the Upper Drum Ass'y.
    (4) Install two of screw ④ using an upper drum hexagonal driver.

    Note: Install the Upper Drum Ass'y while pushing the A portion of it from the arrow direction for no clearance between the Height Determing Plate and Drum Holder.

    (5) Change the upper drum hexagonal driver to the ratchet wrench and tighten screw ④ .
    Tightening torque: 156.9×10^{-2} N·m (16 kgf·cm)

    Note: Turn once the ratchet wrench do not turn it more than once.
    If turning it more than once, the specification of the tightening torque rise too much and the Upper Drum will be transform.

14. Upper drum attachment (A) tool removal.
    Remove the tool in the reverse order of step 4.
15. Brush Slip Ring Ass'y installation
    (1) Install the Brush Slip Ring Ass'y on the fixing surface of the flange with two of screw ② .
    At this time, press the DR-133 board, and screw after confirming that the Brush Slip Ring Ass'y is firmly fixed on the flange surface.
    (2) Raise the SR stopper with a finger, and put the SR stopper in the convex portion of the brush slip ring cover.

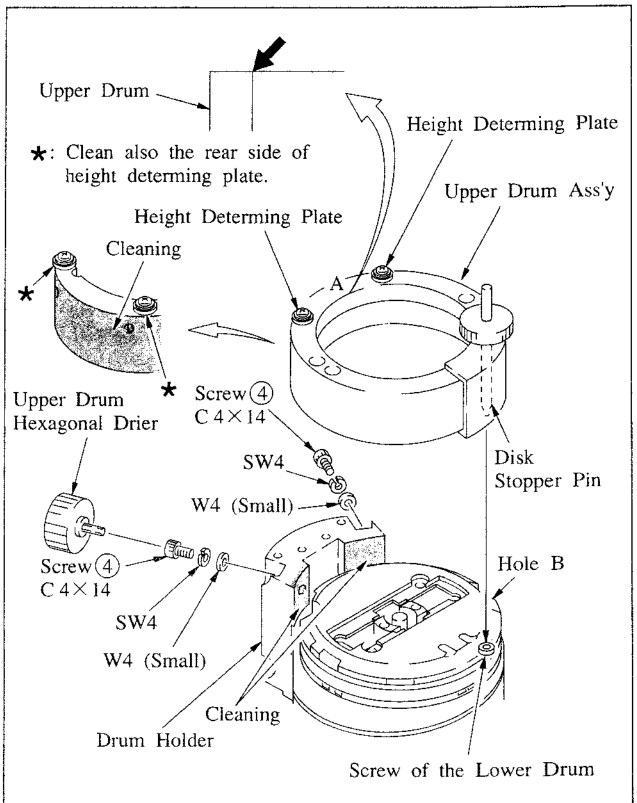

Upper Drum
*: Clean also the rear side of height determing plate.
Height Determing Plate
Upper Drum Ass'y
Height Determing Plate
Cleaning
A
*
Upper Drum Hexagonal Drier
*
Screw④
C 4×14
SW4
W4 (Small)
Disk Stopper Pin
Screw④
C 4×14
SW4
W4 (Small)
Hole B
Cleaning
Drum Holder
Screw of the Lower Drum

Fig. 6-1-10 Upper Drum Ass'y Installation

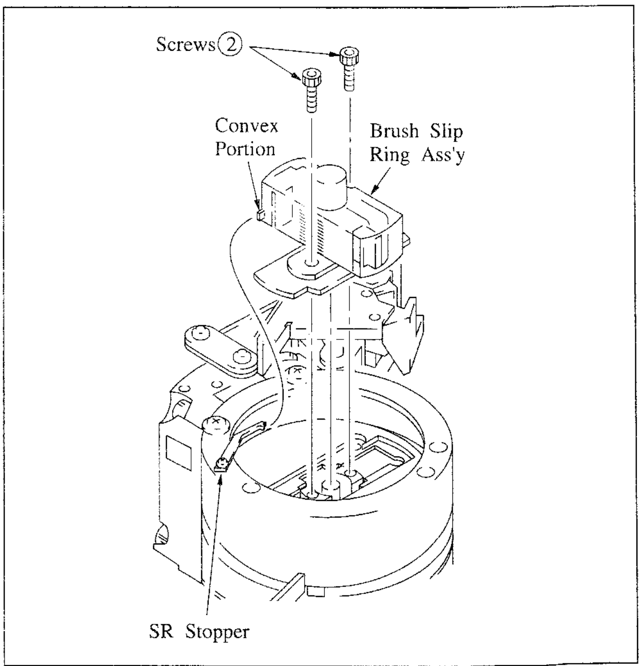

Screws②
Convex Portion
Brush Slip Ring Ass'y
SR Stopper

Fig. 6-1-11 Brush Slip Ring Ass'y Installation

16. Confirmation of clearance between drum holder and upper drum (Fig. 6-1-12)
    (1) Using an upper drum position confirm spacer, confirm that no clearance exists between the height determining plate and drum holder shown in the figure.
    If the clearance exists, repeat steps 13 and later.

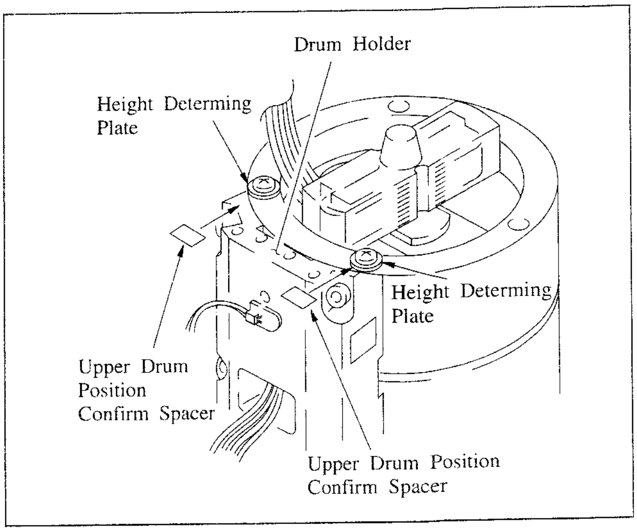

Drum Holder
Height Determing Plate
Height Determing Plate
Upper Drum Position Confirm Spacer
Upper Drum Position Confirm Spacer

Fig. 6-1-12 **Confirmation of Clearance between Drum Holder and Upper Drum**

17. Clean the drum's tape transport path.
    Refer to section 5-2, "Cleaning".
18. Cleaning Roller Ass'y installation.
    Install the Cleaning Roller Ass'y in the reverse order of step 3.
19. Brush harness installation.
    Install the brush harness in the reverse order of step 1.
20. Perform the tape transport adjustment.
    Refer to section 9.
21. Perform the RF signal system adjustment.
    Refer to section 13.
22. Perform the DT adjustment.
    Refer to section 12.

Carry out the following steps on the following sets.

※5 DVR-28 (UC)	: S/N 12501 and higher	DVR-28P (EK)	: S/N 12001 and higher
DVR-28P (UC)	: S/N 12101 and higher	DVR-P28 (UC)	: S/N 10401 and higher

4. Upper drum Ass'y removal (Fig. 6-1-12 (a))
   (1) Loosen the two screws ④ using a Rachet Wrench.
   (2) Replace a Rachet Wrench with a Upper Drum Hexagonal Driver. Remove the two screws④ and remove the Upper Drum.

   Note: When removing the two screws ④, remove the Upper Drum while pushing the A portion of the Upper Drum in the direction of arrow A.

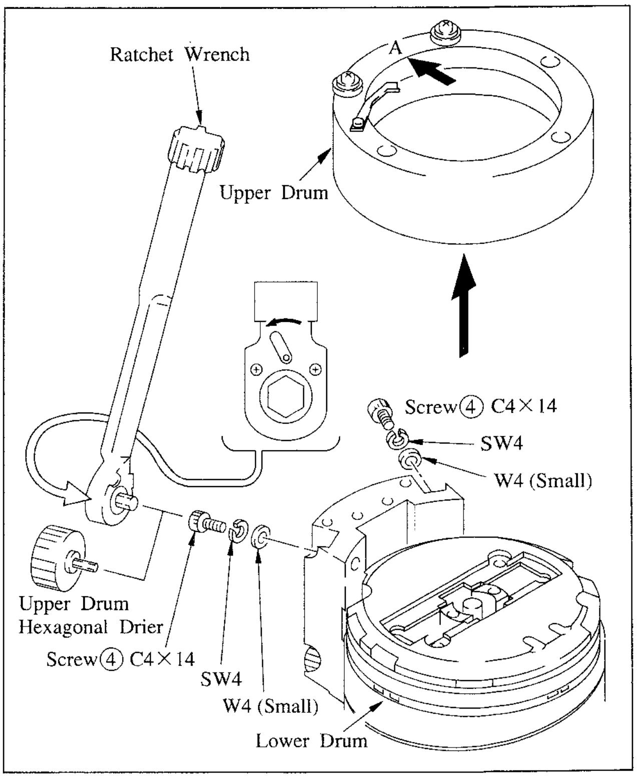

Ratchet Wrench
A
Upper Drum
Screw④ C4×14
SW4
W4 (Small)
Upper Drum
Hexagonal Drier
Screw④ C4×14
SW4
W4 (Small)
Lower Drum

Fig. 6-1-12 (a) Upper Drum Ass'y Removal

5. DR-132 cover removal (Fig. 6-1-12 (b))
   Remove two of screw ⑤ of DR-132 cover displays "5" and "6", then remove the DR-132 cover.

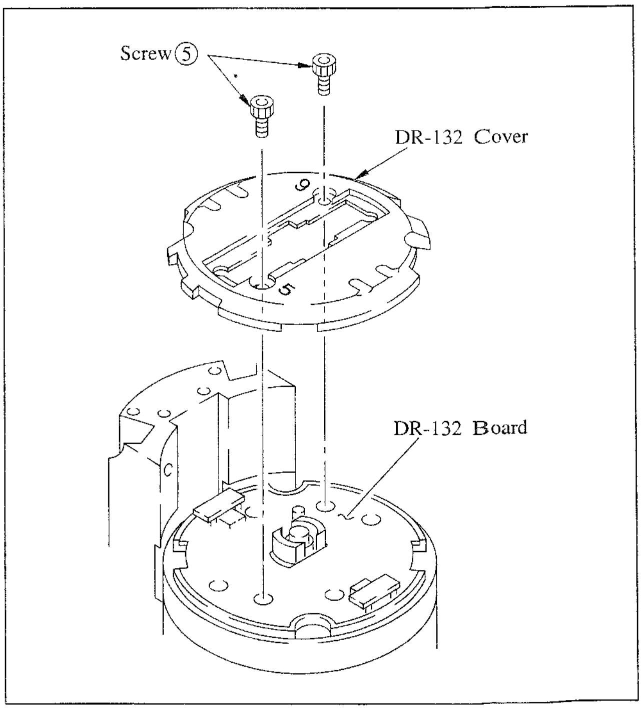

Screw⑤
DR-132 Cover
6
5
DR-132 Board

Fig. 6-1-12 (b) DR-132 Cover Removal

※5 DVR-28 (UC)	: S/N 12501 and higher	DVR-28P (EK)	: S/N 12001 and higher
DVR-28P (UC)	: S/N 12101 and higher	DVR-P28 (UC)	: S/N 10401 and higher

6. DR-132 Ass'y removal (Fig. 6-1-12 (c))
   (1) Extract the two DR-175 boards installed in the DR-132 board taking care that no force is applied to the harness.
   (2) Remove four of screw ⑥ , then remove the DR-132 Ass'y from the Inner Drum Ass'y.

Note: Remove the DR-132 Ass'y taking care not to damage the previously removed DR-175 board.

In this stage, only the component parts of the DR-132 Ass'y can be replaced. Perform steps 10 and later when the DR-132 Ass'y is replaced.

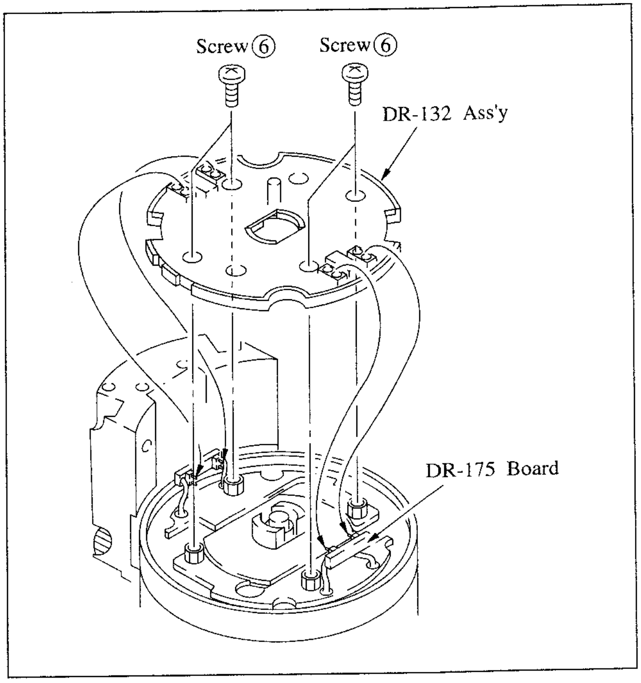


Fig. 6-1-12 (c) DR-132 Ass'y Removal

Head cover installation (Fig. 6-1-12 (d))

The head cover is used to prevent the possible damage of a rotary head when the Inner Drum Ass'y is replaced.

- The head cover is installed in advance in the Inner Drum Ass'y for replacement.
- The installation of the head cover is not required when a disused Inner Drum Ass'y is removed. If you do not wish to damage the rotary head, install the head cover in the Inner Drum Ass'y.

(1) Insert the DR-175 board into the DR-135 board.
(2) Turn the Inner Drum Ass'y with a finger and align the "PLAY A B" indication on the DR-135 board with the position shown in the figure.
(3) Align the head cover with the "PLAY A B" indication on the DR-135 board and install the head cover with four of screw ⑥

7. Inner Drum Ass'y removal
   (1) Turn the Inner Drum Ass'y with a finger and align the "PLAY A B" indication on the DR-135 board with the position shown in the figure.
   (2) Align the "PLAY A B" indication on the DR-135 board with the circumference indication of the head cover and put the head cover on the Inner Drum Ass'y.
   (3) Install the head cover with four screws ⑥ .

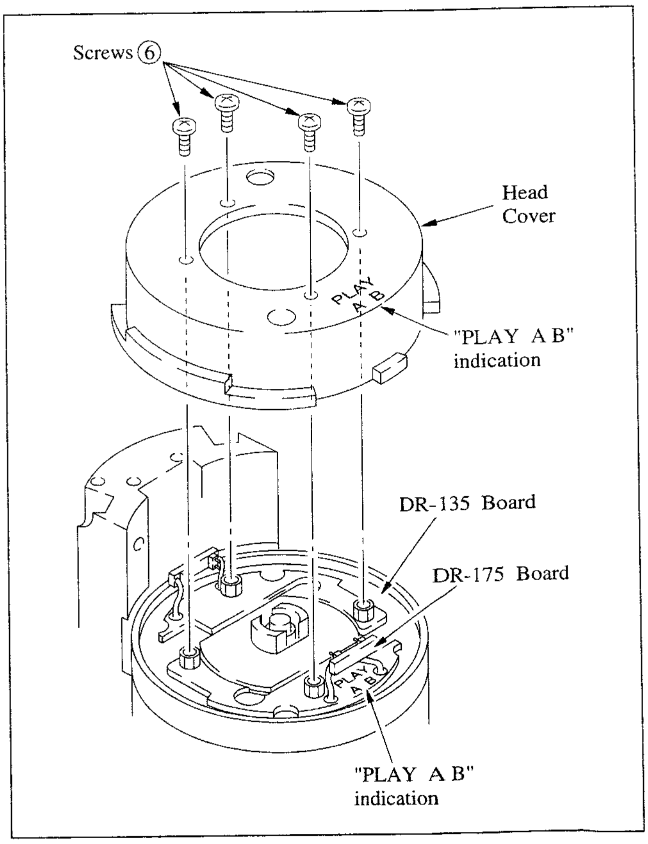


Fig. 6-1-12 (d) Head Cover Installation

※5 DVR-28 (UC) : S/N 12501 and higher DVR-28P (EK) : S/N 12001 and higher
DVR-28P (UC) : S/N 12101 and higher DVR-P28 (UC) : S/N 10401 and higher

(4) Remove two of screw ⑦ from the holes of the head cover shown in the figure.
(5) Raise the Inner Drum Ass'y (with cover) upward, then remove.

8. Inner Drum Ass'y replacement/installation
   (1) The Inner Drum Ass'y for repair parts has a head cover. Adjust the PLAY A B indication position and install the Inner Drum Ass'y in the Lower Drum Ass'y with two of screw ⑦. Remove four of screw ⑥ , then remove the head cover.
   (2) Install the head cover in the Inner Drum Ass'y in which no head cover is installed referring to step 8. Then, install the Lower Drum Ass'y as in step (1).
   (3) Stick a new inner durm seal supplied with the Inner Drum Ass'y for repair over the old inner drum seal.

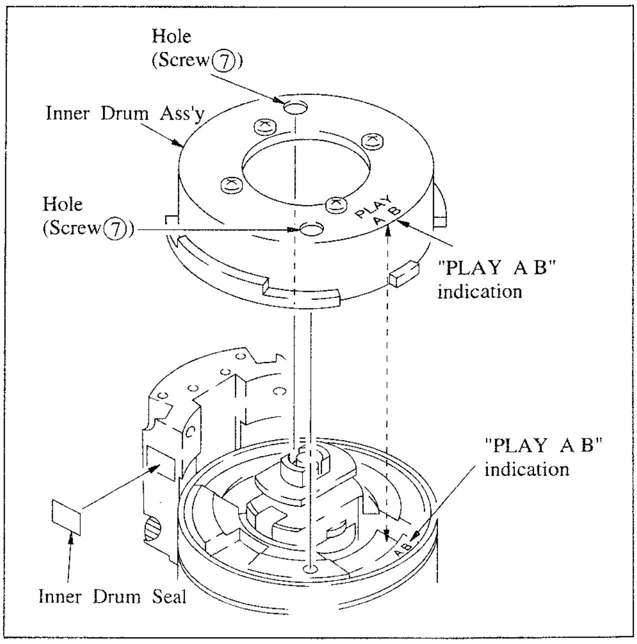

Hole
(Screw⑦)
Inner Drum Ass'y
Hole
(Screw⑦)
PLAY A B
"PLAY A B"
indication
"PLAY A B"
indication
A B
Inner Drum Seal

Fig. 6-1-12 (e) Inner Drum Ass'y Replacement

9. Inner drum eccentricity adjustment
   Refer to section 6-1-2.
10. DR-132 Ass'y Installation
   (1) Remove two DR-175 boards from the DR-135 board.
   (2) Install the DR-132 Ass'y in the Inner Drum Ass'y with four screws ⑥.
   (3) Remove two DR-175 boards into the DR-132 board. (Refer to Fig. 6-1-12 (c).)
11. DR-132 cover installation
   Install the DR-132 cover in the Inner Drum Ass'y with two screws ⑤. (Refer to Fig. 6-1-12 (b).)

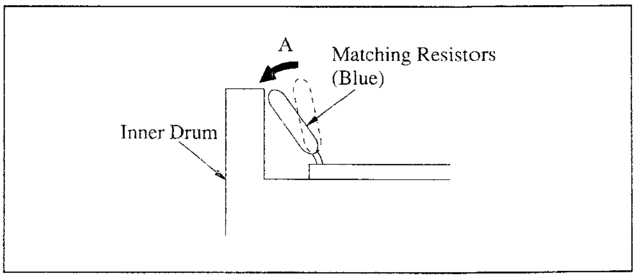

A
Matching Resistors
(Blue)
Inner Drum

Fig. 6-1-12 (f) DR-132 Cover Installation (1)

Note1: Check that the two matching resistors (blue color) were inclined in the direction of arrow A. If the two matching resistors were not inclined, incline them as shown in Fig. 6-1-12 (f).

Note2: Move the XY harness (black/yellow color) of the DR-175 Board in the direction of arrow A so as not to put the XY harness on the DR-132 Shield. (Fig. 6-1-12 (g))

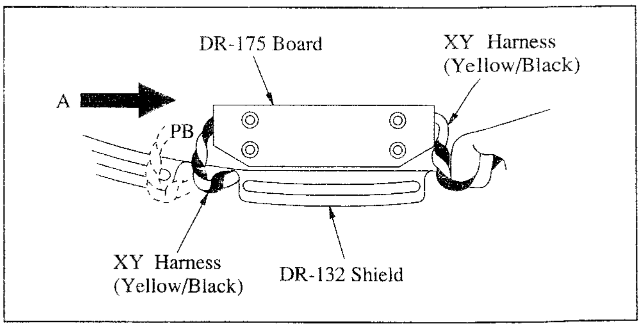

DR-175 Board
XY Harness
(Yellow/Black)
A
PB
XY Harness
(Yellow/Black)
DR-132 Shield

Fig. 6-1-12 (g) DR-132 Cover Installation (2)

※5 DVR-28 (UC) : S/N 12501 and higher	DVR-28P (EK) : S/N 12001 and higher
DVR-28P (UC) : S/N 12101 and higher	DVR-P28 (UC) : S/N 10401 and higher

12. Upper Drum Ass'y Installation (Fig. 6-1-12 (h))
    (1) Clean the drum holder and upper drum's fixing surface with cleaning piece moistened with cleaning fluid. After cleaning, wipe it with dry cloth two or three times.
    (2) Fasten the Upper Drum Ass'y to the Drum Holder with the two screws ④ using a Upper Drum Hexagonal Driver while holding the Upper Drum Ass'y.

    Note: Install the Upper Drum Ass'y while pusing the A portion of it from the arrow direction for no clearance between the Height Determing Plate and Drum Holder..

    (3) Change the upper drum hexagonal driver to the ratchet wrench and tighten screw ④ .
    Tightening torque: 156.9 x 10^{-2} N·m (16 kgf·cm)

    Note: Turn once the ratchet wrench do not turn it more than once.
    If turning it more than once, the specification of the tightening torque rise too much and the Upper Drum will be transform.

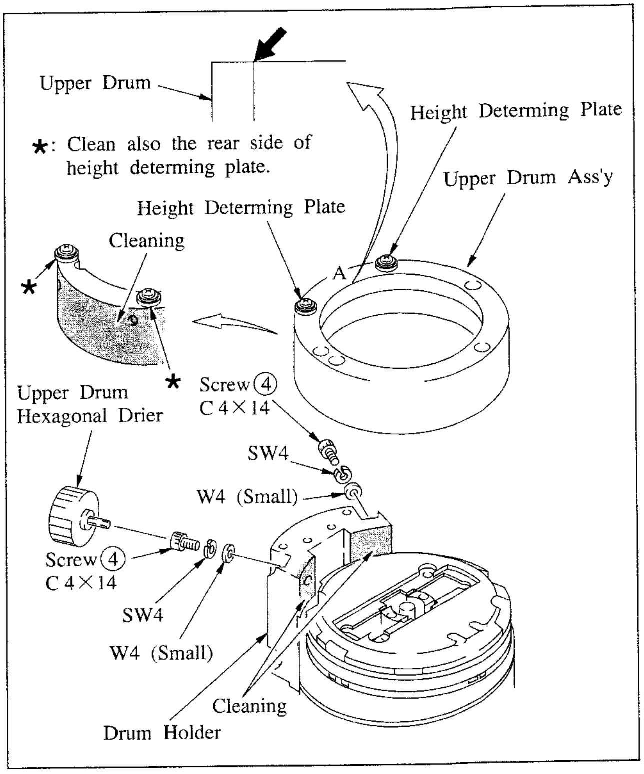

Upper Drum
★: Clean also the rear side of height determing plate.
Height Determing Plate
Upper Drum Ass'y
Height Determing Plate
Cleaning
A
★
Upper Drum Hexagonal Drier
★
Screw④
C 4×14
SW4
W4 (Small)
Screw④
C 4×14
SW4
W4 (Small)
Cleaning
Drum Holder

Fig. 6-1-12 (h) Upper Drum Ass'y Installation

13. Brush Slip Ring Ass'y installation
    (1) Install the Brush Slip Ring Ass'y on the fixing surface of the flange with two of screw ② .
    At this time, press the DR-133 board, and screw after confirming that the Brush Slip Ring Ass'y is firmly fixed on the flange surface.
    (2) Raise the SR stopper with a finger, and put the SR stopper in the convex portion of the brush slip ring cover.

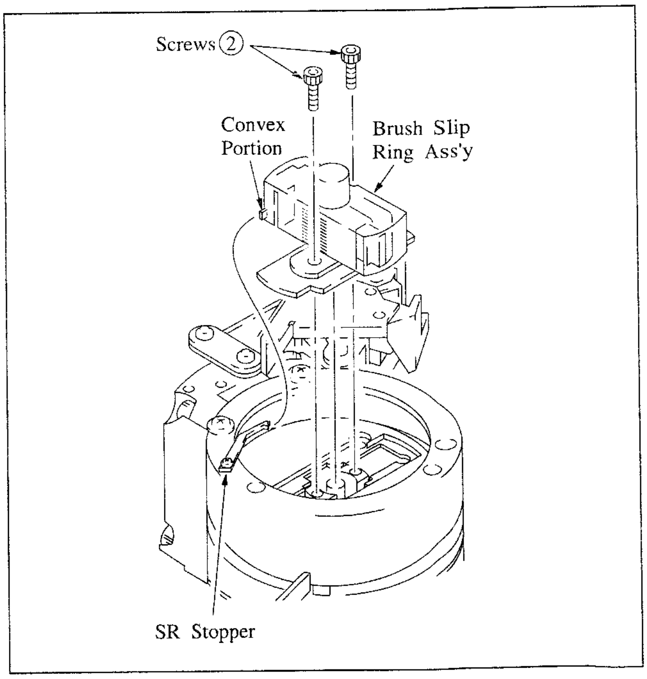

Screws②
Convex Portion
Brush Slip Ring Ass'y
SR Stopper

Fig. 6-1-12 (j) Brush Slip Ring Ass'y Installation

※5	DVR-28 (UC) : S/N 12501 and higher	DVR-28P (EK) : S/N 12001 and higher
	DVR-28P (UC) : S/N 12101 and higher	DVR-P28 (UC) : S/N 10401 and higher

14. Confirmation of clearance between drum holder and upper drum (Fig. 6-1-12 (j))
    (1) Using an upper drum position confirm spacer, confirm that no clearance exists between the height determining plate and drum holder shown in the figure.
    If the clearance exists, repeat steps 12 and later.

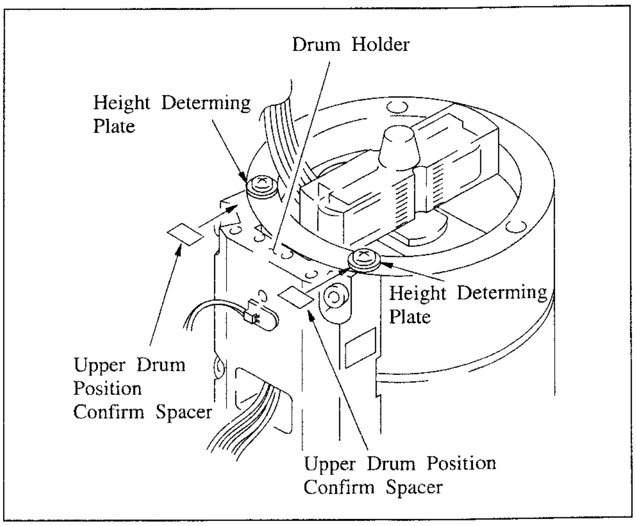

Drum Holder
Height Determing Plate
Height Determing Plate
Upper Drum Position Confirm Spacer
Upper Drum Position Confirm Spacer

Fig. 6-1-12 (j) Confirmation of Clearance between Drum Holder and Upper Drum

15. Clean the drum's tape transport path.
    Refer to section 5-2, "Cleaning".
16. Cleaning Roller Ass'y installation.
    Install the Cleaning Roller Ass'y in the reverse order of step 3.
17. Brush harness installation.
    Install the brush harness in the reverse order of step 1.
18. Perform the Drum Motor alignment.
    Refer to section 10-4.
19. Perform the tape transport adjustment.
    Refer to section 9.
20. Perform the RF signal system adjustment.
    Refer to section 13.
21. Perform the DT adjustment.
    Refer to section 12.

– MEMO –

6-1-2. Inner Drum Eccentricity Adjustment

Basic Knowledge

A. Perform the inner drum eccentricity adjustment when the Inner Drum Ass'y is replaced or removed and when the screw ① fixing the Inner Drum Ass'y is loosened.

B. There was some difference in the adjustment procedures because some part of the Inner Drum Ass'y was changed on the following sets.

DVR-28 (UC) : S/N 12501 and higher
DVR-28P (UC) : S/N 12101 and higher
DVR-28P (EK) : S/N 12001 and higher
DVR-P28 (UC) : S/N 10401 and higher

C. Prepare the following tool for eccentricity adjustment:
Inner Drum Eccentricity Adjustment Tool DM-401
Sony Part No.: J-6254-010-A

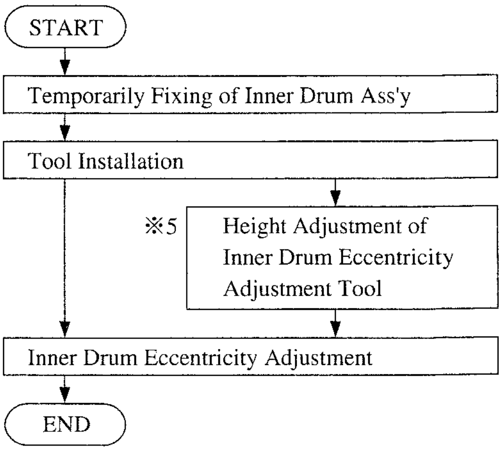
D. Remove the parts below that are installed in the Drum Ass'y when performing the adjustment.
- Cleaning Roller Ass'y
- Upper Drum
- Brush Sling Ring Ass'y
- DR-132 Cover
- DR-132 Ass'y

Refer to section 6-1-1 when removing the above parts. Be careful not to damage the rotary head or the side surface of the drum.

E. Perform the tool operation check referring to section 5-4-1 before adjustment.

F. Flowchart for the replacement.
Carry out the step with ※5 mark on the following serial numbers.

DVR-28 (UC) : S/N 12501 and higher
DVR-28P (UC) : S/N 12101 and higher
DVR-28P (EK) : S/N 12001 and higher
DVR-P28 (UC) : S/N 10401 and higher


START
Temporarily Fixing of Inner Drum Ass'y
Tool Installation
※5
Height Adjustment of Inner Drum Eccentricity Adjustment Tool
Inner Drum Eccentricity Adjustment
END

Adjustment Procedure

1. Temporarily fixing of Inner Drum Ass'y (Fig. 6-1-13)
Loosen two of screw ① shown in the figure by 1/2 turn and set the Inner Drum Ass'y to the temporarily fixing state.

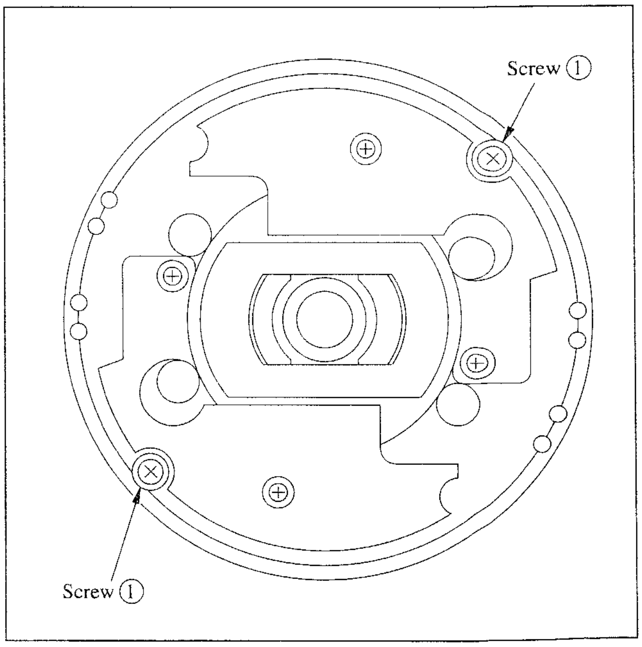

Screw ①
Screw ①

Fig. 6-1-13 Temporary Fixing of Inner Drum Ass'y

Carry out the steps on and after page 6-11 (a) except the following sets.

DVR-28 (UC) : S/N 10001 through 12500	DVR-28P (EK) : S/N 10001 through 12000
DVR-28P (UC) : S/N 10001 through 12100	DVR-P28 (UC) : S/N 10001 through 10400

2. Tool installation (Fig. 6-1-14)
   (1) Turn knob ① of the tool counterclockwise.
   (2) Move the dial gauge block of the tool in the direction indicated by arrow A and confirm that no clearance exists in the place shown in Fig-1.
   (3) Move the dial gauge block in the direction indicated by arrow C while pulling knob ② in the direction of arrow B, then lock the block.
   (4) Install the tool in the drum holder and tighten it with knob ③.

Note 1: Do not touch the rotary head during tool installation. Be careful not to damage the side surface of the drum.

Note 2: Install the tool firmly so that no clearance exists between the tool and drum holder.

   (5) Turn the inner drum with a finger so that the probe of the tool does not strike against the rotary head, then set the rotary head free.
   (6) Rotate the zero-point adjustment knob of the tool clockwise by one to two turns.
   (7) Hold the dial gauge block by hand and pull knob ② in the direction indicated by arrow B.
   (8) Move the dial gauge block gently in the direction indicated by arrow E so that it strikes against the side surface of the drum.

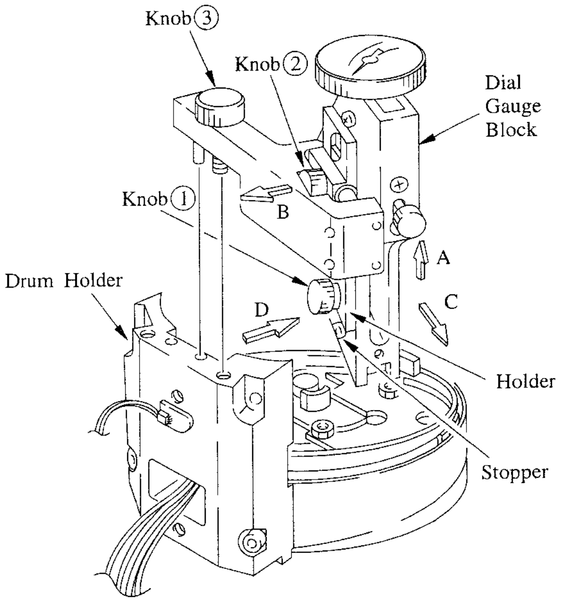
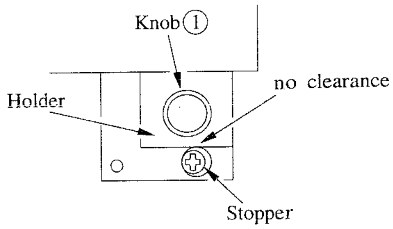

Knob③
Knob②
Dial Gauge Block
Knob①
B
A
Drum Holder
D
C
Holder
Stopper

Fig.1
(Viewing from direction D)


Knob①
no clearance
Holder
Stopper

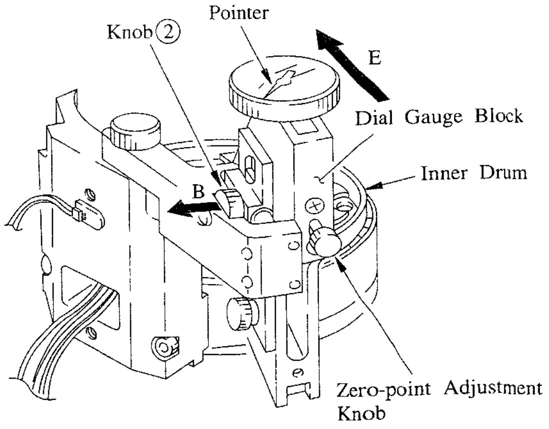

Pointer
Knob②
E
Dial Gauge Block
Inner Drum
B
Zero-point Adjustment Knob

Fig. 6-1-14 Tool Installation

3. Confirmation of tool and head contact surface (Fig. 6-1-15)
   (1) Confirm that two ribs touch the side surface of the lower drum as shown in the figure.
   (2) Confirm that the measurement pin strikes against the side surface of the inner drum (the pin does not strike against it yet). Confirm that the measurement pin does not touch the rotary head. If it touches, repeat steps 1 and later.

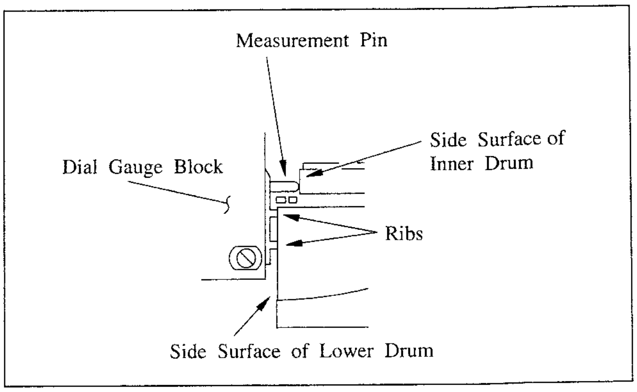


Fig. 6-1-15 Confirmation of Tool and Head Contact Surface

4. Inner drum eccentricity adjustment (Fig. 6-1-16)
   (1) Turn the zero-point adjustment knob of the tool slowly counterclockwise so that it touches the side surface of the inner drum.
   (2) Adjust the pointer of the dial gauge to zero.
   (3) Turn the inner drum slowly clockwise. Confirm that the pointer deflection of the dial gauge obtained when the inner drum is rotated by one turn meets the specification.

      Specification: With 2 µm

      If the specification is met, perform steps (6) and later. If it is not, perform steps (4) and later.
   (4) Turn the inner drum slowly clockwise with a finger and stop it in the position where the pointer deflection of the dial gauge is minimum.
   (5) With a finger, press the upper edge of the inner drum on the opposite side of the tool's measurement pin by 180 degrees and adjust so that the pointer deflection of the dial gauge is a half of the maximum value.
   (6) Tighten two screws ① alternately.
      Tightening torque: 117.6 × 10^{-2} N·m (12 kg·cm)
      Perform step (3) again after the screws are tightened and confirm that the specification is met.
5. Remove the tool in the reverse order of step 2.

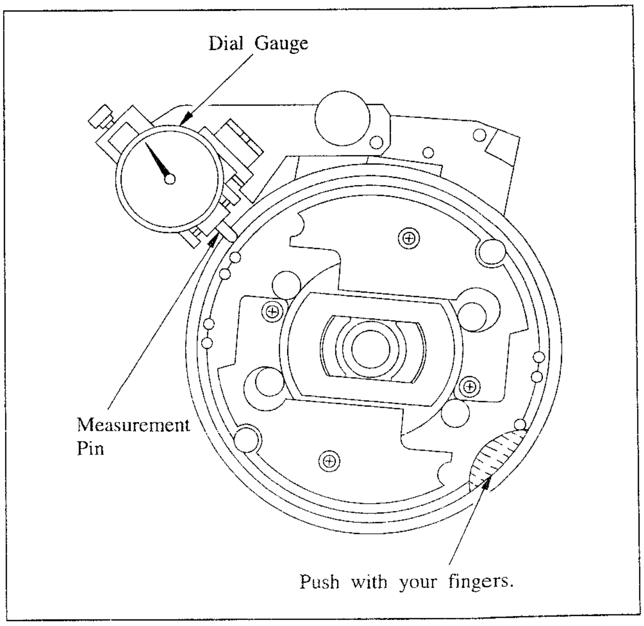


Fig. 6-1-16 Inner Drum Eccentricity Adjustment

Carry out the following steps on the following sets.

※5 DVR-28 (UC)	: S/N 12501 and higher	DVR-28P (EK)	: S/N 12001 and higher
DVR-28P (UC)	: S/N 12101 and higher	DVR-P28 (UC)	: S/N 10401 and higher

2. Tool installation (Fig. 6-1-17)
   (1) Turn knob ① of the tool counterclockwise.
   (2) Move the dial gauge block of the tool in the direction indicated by arrow A and confirm that no clearance exists in the place shown in Fig-1.
   (3) Move the dial gauge block in the direction indicated by arrow C while pulling knob ② in the direction of arrow B, then lock the block.
   (4) Install the tool in the drum holder and tighten it with knob ③.

   Note 1: Do not touch the rotary head during tool installation. Be careful not to damage the side surface of the drum.
   Note 2: Install the tool firmly so that no clearance exists between the tool and drum holder.

   (5) Turn the inner drum with a finger so that the probe of the tool does not strike against the rotary head, then set the rotary head free.
   (6) Rotate the zero-point adjustment knob of the tool clockwise by one to two turns.
   (7) Hold the dial gauge block by hand and pull knob ② in the direction indicated by arrow B.
   (8) Move the dial gauge block gently in the direction indicated by arrow E so that it strikes against the side surface of the drum.

   Note : Check that the probe of the Tool is not touched to the portion A of the Upper Drum as shown in Fig 2. And check that the probe of the Tool in not touched to the portion B when turning the Drum using your hand as shown in Fig 2. If touching, remove the Tool and carry out Step 3. (Reinstall the Tool after carrying out Step 3.) If not touching, carry out Step 4.

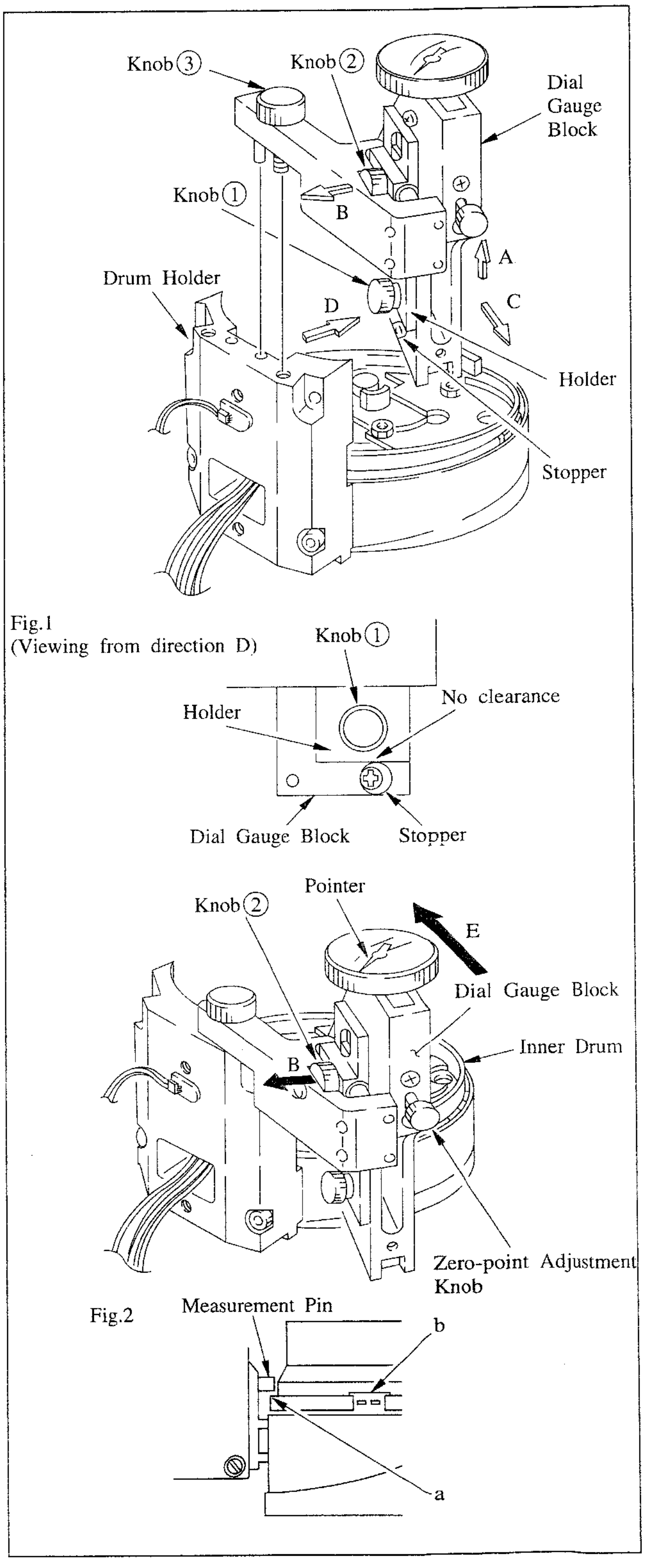

Knob③
Knob②
Dial Gauge Block
Knob①
B
A
Drum Holder
D
C
Holder
Stopper
Fig.1
(Viewing from direction D)
Knob①
No clearance
Holder
Dial Gauge Block
Stopper
Pointer
Knob②
E
Dial Gauge Block
Inner Drum
B
Zero-point Adjustment Knob
Fig.2
Measurement Pin
b
a

Fig. 6-1-17 Tool Installation

※5 DVR-28 (UC)	: S/N 12501 and higher	DVR-28P (EK)	: S/N 12001 and higher
DVR-28P (UC)	: S/N 12101 and higher	DVR-P28 (UC)	: S/N 10401 and higher

3 Height Adjustment of Inner Drum Eccentricity Sdjustment Tool (Fig. 6-1-18)
- Carry out this adjustment so that the probe of the Tool lifts up 0.2 mm more than the Holder (specified hight).
  (1) Loosen the knob ①. And tighten the Knob ① while knocking the Holder against the Stopper.
  (2) Loosen a Stopper after loosing a Stopper Fixing Screw.
  (3) Pinch a Thickness Gauge between the Holder and Stopper. Tighten the Stopper Fixing Screw while pushing the Stopper against the direction A.
  (4) Carry out Step (1).

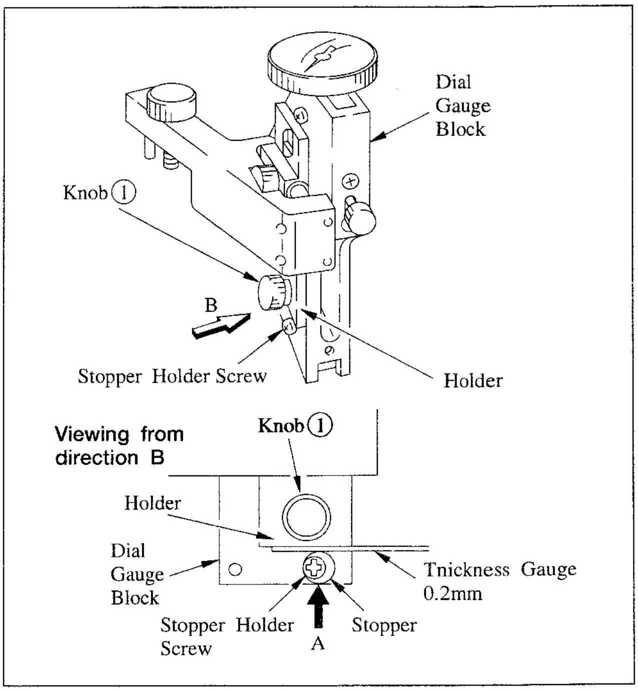

Dial Gauge Block
Knob①
B
Stopper Holder Screw
Holder
Viewing from direction B
Knob①
Holder
Dial Gauge Block
Tnickness Gauge 0.2mm
Stopper Holder Screw
A
Stopper

Fig. 6-1-18 Check of Tool and Head Contact Surface (1)

4. Confirmation of tool and head contact surface (Fig. 6-1-19)
   (1) Confirm that two ribs touch the side surface of the lower drum as shown in the figure.
   (2) Check that the probe contacts about 1 mm on the side of the Inner Drum using your eyes.
   But do not touch them.
   Note : Do not touch the probe on the Rotary Head.
   If touching, carry out from step 1.

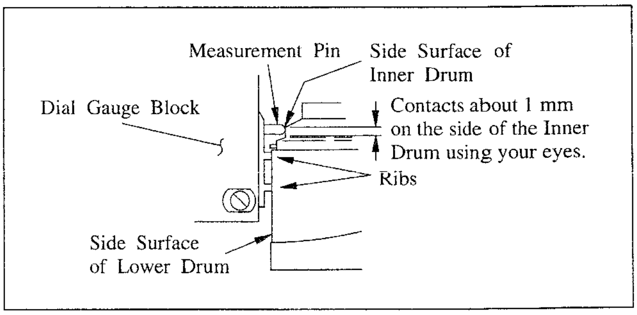

Measurement Pin
Side Surface of Inner Drum
Dial Gauge Block
Contacts about 1 mm on the side of the Inner Drum using your eyes.
Ribs
Side Surface of Lower Drum

Fig. 6-1-19 Check of Tool and Head Contact Surface (2)

5. Inner drum eccentricity adjustment (Fig. 6-1-20)
   (1) Turn the zero-point adjustment knob of the tool slowly counterclockwise so that it touches the side surface of the inner drum.
   (2) Adjust the pointer of the dial gauge to zero.
   (3) Turn the inner drum slowly clockwise.
   Confirm that the pointer deflection of the dial gauge obtained when the inner drum is rotated by one turn meets the specification.

   Specification: With 2 μm

   If the specification is met, perform steps (6) and later. If it is not, perform steps (4) and later.
   (4) Turn the inner drum slowly clockwise with a finger and stop it in the position where the pointer deflection of the dial gauge is minimum.
   (5) With a finger, press the upper edge of the inner drum on the opposite side of the tool's measurement pin by 180 degrees and adjust so that the pointer deflection of the dial gauge is a half of the maximum value.
   (6) Tighten two screws ① alternately.
   Tightening torque: 117.6 × 10^{-2} N·m (12 kg·cm)
   Perform step (3) again after the screws are tightened and confirm that the specification is met.
6. Remove the tool in the reverse order of step 2.

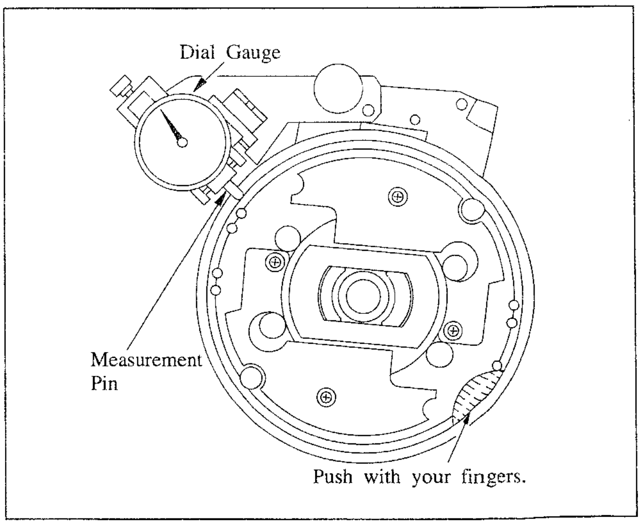

Dial Gauge
Measurement Pin
Push with your fingers.

Fig. 6-1-20 Inner Drum Eccentricity Adjustment

6-2. DRUM ASS'Y REPLACEMENT

Basic Knowledge

A. It is necessary to perform the Drum Ass'y replacement in case of the following conditions:

(1) When the RF waveform cannot be obtained to the specified waveform even if the tracking adjustment is performed because the lead surface of a lower drum or the tape transport surface of an upper drum is worn.

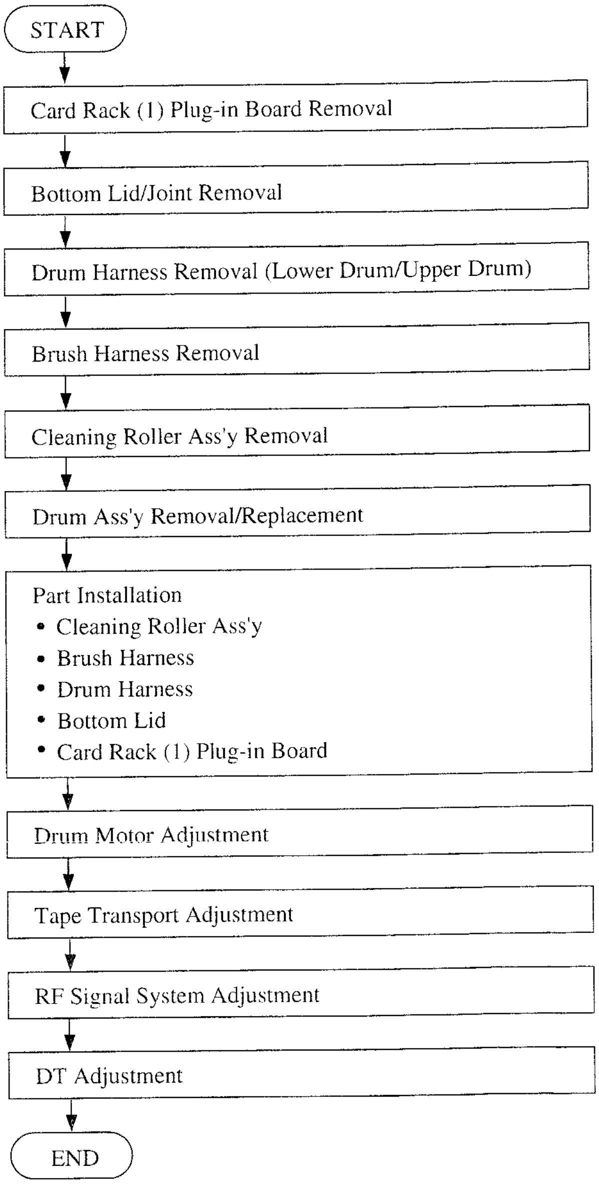
(2) When the lead surface of a lower drum and the tape transport surface of upper and lower drums are damaged and cannot be corrected.

(3) When the specifications of the VTR cannot be maintained due to the bearing life of a drum rotor block.

B. Prepare the following tools:

- Hexagon Wrench Driver (Across flat has 2.5 mm)
  Sony Part No.: 7-700-766-04
- Torque Screwdriver 117.6×10^{-2} N·m (12 kg.cm)
  Sony Part No.: J-6252-520-A
- Torque Screwdriver Bit Set
  Sony Part No.: J-6252-540-A
- Thickness Gauge
  Sony Part No.: J-6041-670-A
- Cleaning Fluid (or the equivalent)
  Sony Part No.: 9-919-573-00
- Cleaning Piece
  Sony Part No.: 2-034-697-00

C. The replacement flowchart is shown below:


START
Card Rack (1) Plug-in Board Removal
Bottom Lid/Joint Removal
Drum Harness Removal (Lower Drum/Upper Drum)
Brush Harness Removal
Cleaning Roller Ass'y Removal
Drum Ass'y Removal/Replacement
Part Installation
• Cleaning Roller Ass'y
• Brush Harness
• Drum Harness
• Bottom Lid
• Card Rack (1) Plug-in Board
Drum Motor Adjustment
Tape Transport Adjustment
RF Signal System Adjustment
DT Adjustment
END

Replacement

1. Card rack (1) plug-in board removal
   - Remove the Card rack (1) Plug-in board: MD-62 Board, SSP-07 Board, PR-157 Board, DE-37 Board, EN-99 Board and AD-73 Board (DVR-P28: AD-90 Board).

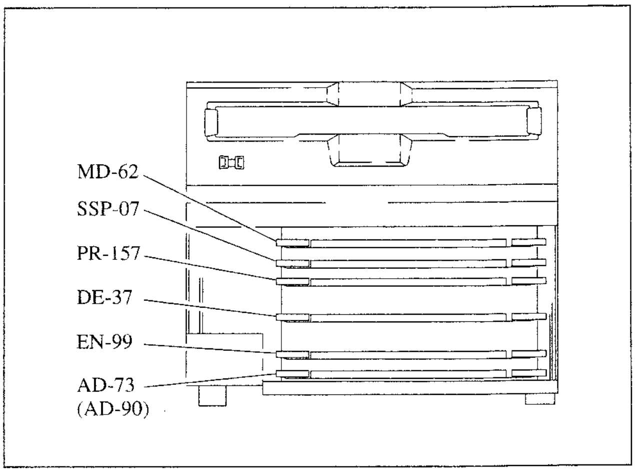

MD-62
SSP-07
PR-157
DE-37
EN-99
AD-73
(AD-90)

Fig.6-2-1 Card Rack (1) Plug-in Board

2. Drum harness removal (Lower side of drum)
   (1) Turn the power block upside down and lay the machine on its side.

   Note: Be careful not to shock the machine.

   (2) Remove six of screw ①, then remove the bottom lid.

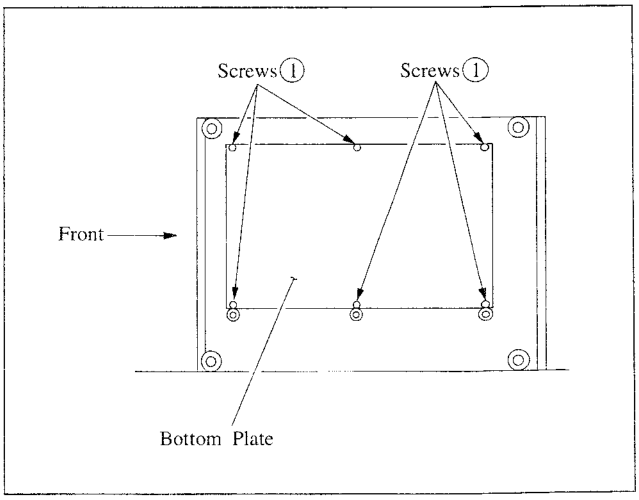

Screws①
Screws①
Front
Bottom Plate

Fig.6-2-2 Bottom Lid Removal

   (3) Remove connectors CN321, CN322, and CN323 that are connected to the drum.
   (4) Return the machine to the horizontal position.

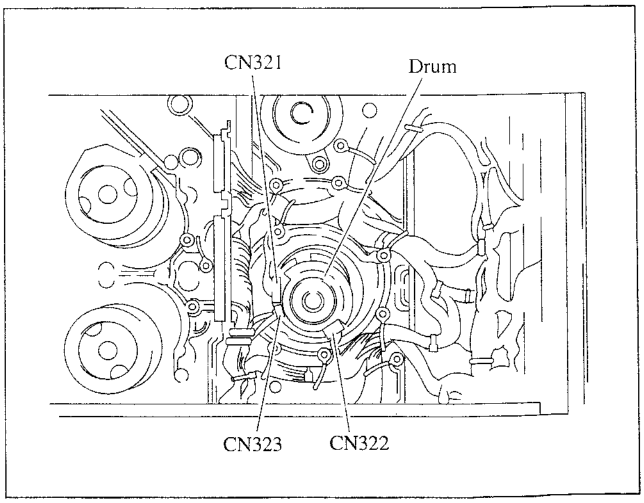

CN321
Drum
CN323
CN322

Fig.6-2-3 Drum Harness Removal (Lower Side of Drum)

3. Joint Removal (Fig. 6-2-4)
   (1) Push the lever shown in the figure in the direction of the arrow, and lift the UD Ass'y in the direction of the arrow.
   (2) Remove two of screw ②, then remove the joint.

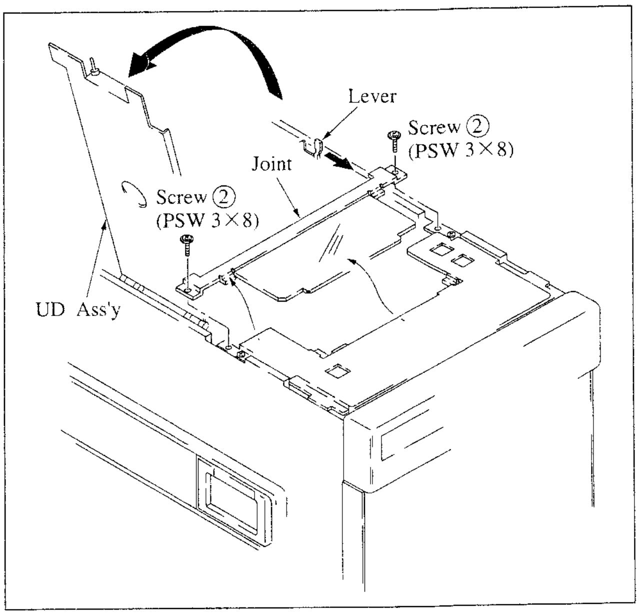

Lever
Screw ②
(PSW 3×8)
Joint
Screw ②
(PSW 3×8)
UD Ass'y

Fig.6-2-4 Joint Removal

4. Drum harness removal (on TTP side) (Fig. 6-2-5)
   (1) Remove the connectors of the drum harnesses from each board.
   (2) Remove the drum harnesses from the harness clampers.

   Note: The DVR-P28 does not have the REC-11 Board, connectors CN451 to CN454 and CN481 to 484.

5. Brush harness removal
   (1) Remove two of screw ③, then remove the board cover.
   (2) Remove the brush harness connector and DUE sensor connector from the CN-171 board.

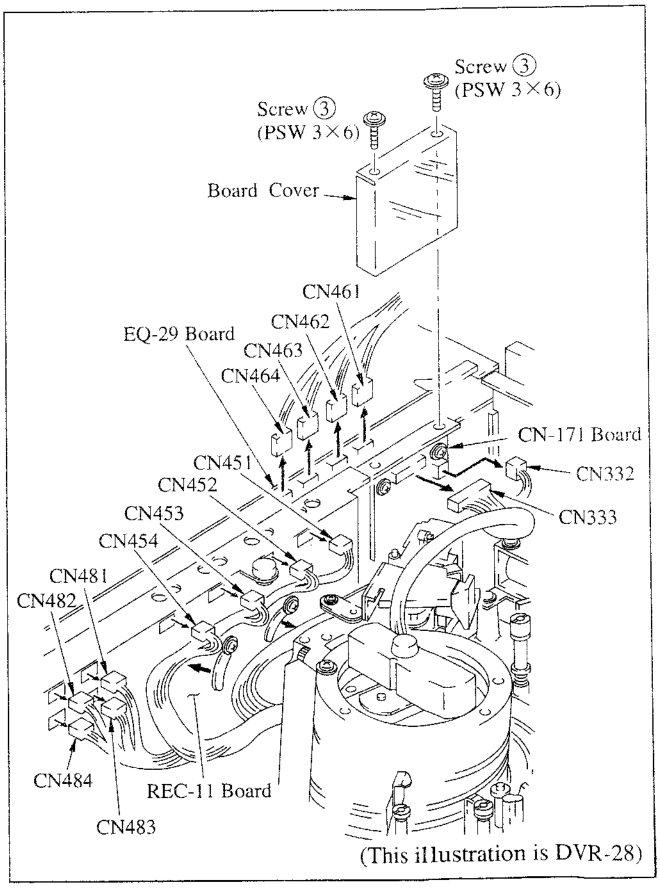

Screw ③
(PSW 3×6)
Screw ③
(PSW 3×6)
Board Cover
CN461
CN462
EQ-29 Board
CN463
CN464
CN-171 Board
CN332
CN333
CN451
CN452
CN453
CN454
CN481
CN482
CN484
REC-11 Board
CN483
(This illustration is DVR-28)

Fig.6-2-5 Drum Harness (on TTP side)/ Brush Harness Removal

6. Cleaning Roller Ass'y removal (Fig. 6-2-6)
   (1) Remove two of screw ④ , then remove the Cleaning Roller Ass'y from the drum holder.
   (2) Remove connector CN802 from the CN-309 board of the Cleaning Roller Ass'y.

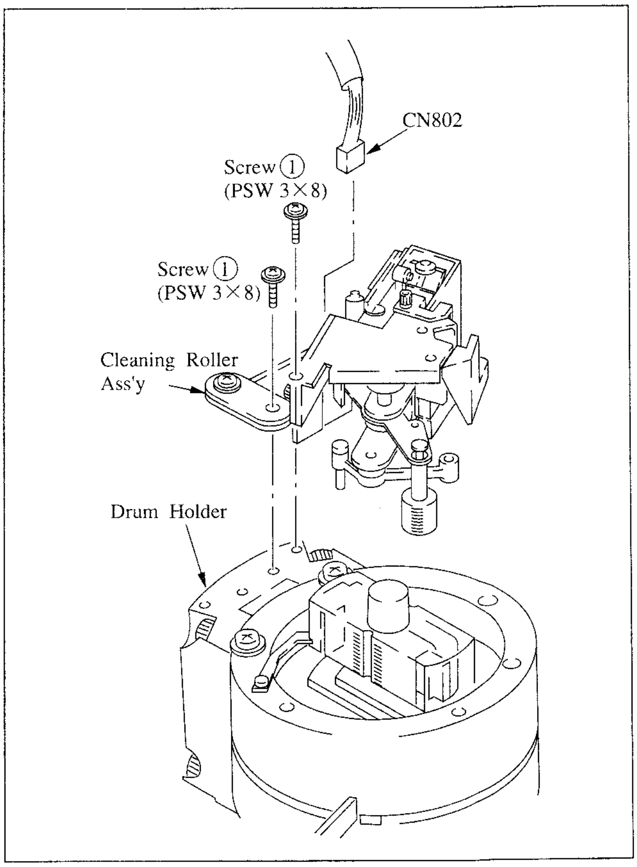

CN802
Screw ①
(PSW 3×8)
Screw ①
(PSW 3×8)
Cleaning Roller
Ass'y
Drum Holder

Fig.6-2-6 Cleaning Roller Ass'y Removal

7. Drum Ass'y removal (Fig. 6-2-7)
   - The Drum Ass'y is installed in the machine with three of screw ⑤ beneath holes A, B, and C shown in the figure. The Drum Ass'y can be removed by removing screws ⑤ .

   (1) View hole A shown in the figure from the above and seek for screw ⑤ while turning the Inner Drum Ass'y clockwise with a finger.
   Align the mark in the inner drum shown in the figure with hole A. Screw ⑤ can then be confirmed.
   (2) Loosen screws ⑤ completely using a hexagon wrench driver.
   (3) Perform the operation for holes B and C in the same manner as in the procedure of steps (1) and (2). Loosen two of screw ⑤ completely.

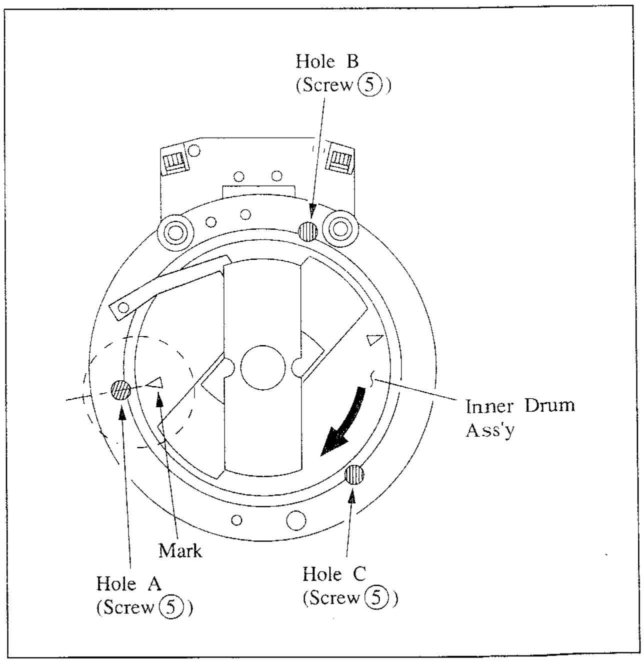

Hole B
(Screw ⑤)
Inner Drum
Ass'y
Mark
Hole A
(Screw ⑤)
Hole C
(Screw ⑤)

Fig.6-2-7 Drum Ass'y Removal

(4) Remove the Drum Ass'y from the drum base.

8. Drum Ass'y installation (Fig. 6-2-8)
   (1) Clean the contact surface of the Drum Ass'y and drum base with cleaning piece moistened with cleaning fluid. After cleaning, wipe it with dry cloth two or three times.
   (2) Align the two positioning holes of the Drum Ass'y with the two positioning pins of the drum base, then install the Drum Ass'y in the base.

Note: Confirm that no play exists with the Drum Ass'y installed in the base.

   (3) Tighten three of screw ⑤ in the procedure of step 7, (1) through (3).

Tightening torque: 117.6 × 10^{-2} N·m (12 kg·cm)

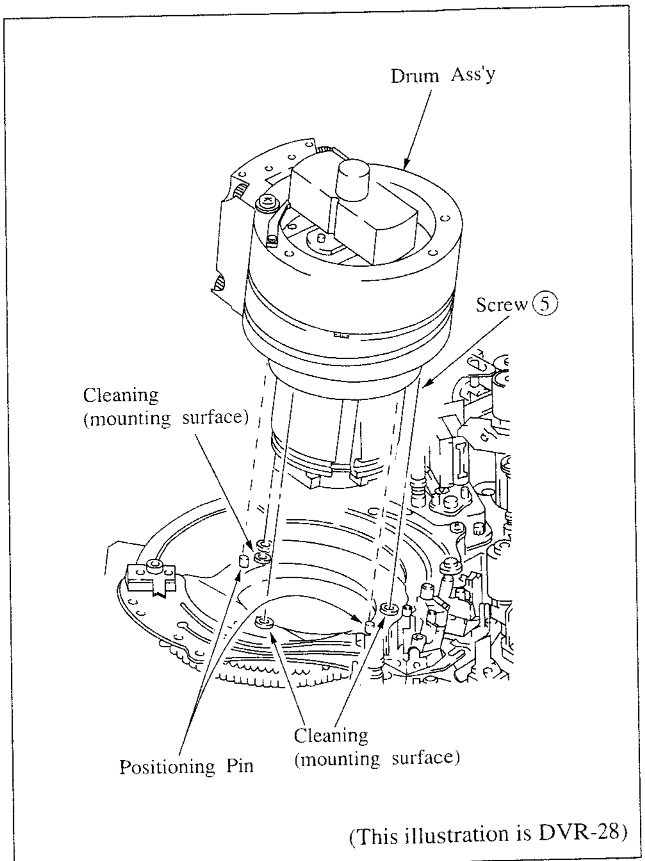


Fig.6-2-8 Drum Ass'y Replacement

9. Part installation
   - Cleaning Roller Ass'y
   - Brush Harness
   - Drum Harness
   - Card Rack (1) Plug-in Board
   (1) Install the parts above in the reverse order of steps 1 through 6.
   (2) Clean the drum tape transport surface and tape lead surface in accordance with the section 5-2 cleaning after each part is installed.
10. Perform the drum motor adjustment.
    Refer to section 10.
11. Perform the tape transport adjustment.
    Refer to section 9.
12. Perform the RF signal system adjustment.
    Refer to section 13.
13. Perform the DT adjustment.
    Refer to section 12.

6-3. BRUSH SLIP RING ASS'Y REPLACEMENT

Basic Knowledge

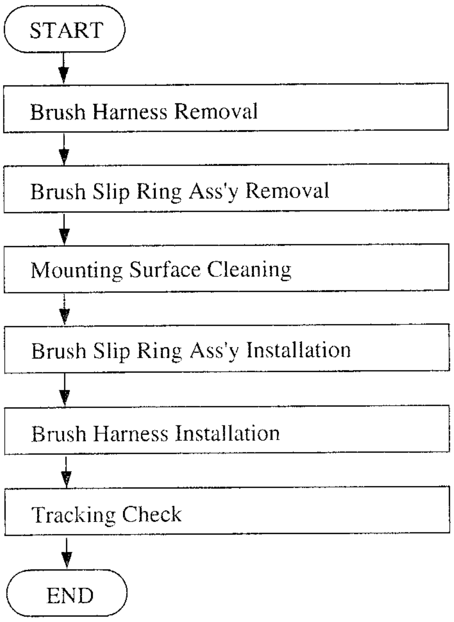
A. Replace the whole assembly when replacing the Brush Slip Ring Ass'y. The component part of this assembly cannot be replaced as the service part.

B. Never apply conductive grease on the contacting point of the brush slip ring. The performance cannot be guaranteed.

C. It is not necessary to perform the adjustment after replacement. Confirm that the brushes are placed in the groove of the slip ring after replacement.

D. Prepare the following tools:
- Cleaning Piece
  Sony Part No.: 2-034-697-00
- Cleaning Fluid (or the equivalent)
  Sony Part No.: 9-919-573-00

E. The replacement flowchart is shown below:


START
Brush Harness Removal
Brush Slip Ring Ass'y Removal
Mounting Surface Cleaning
Brush Slip Ring Ass'y Installation
Brush Harness Installation
Tracking Check
END

Replacement

1. Brush harness removal (Fig. 6-3-1)
   (1) Remove the brush harness from the harness clamper.
   (2) Remove two of screw ①, then remove the board cover. Extract connector CN333 from the CN-171 board and remove the brush harness.

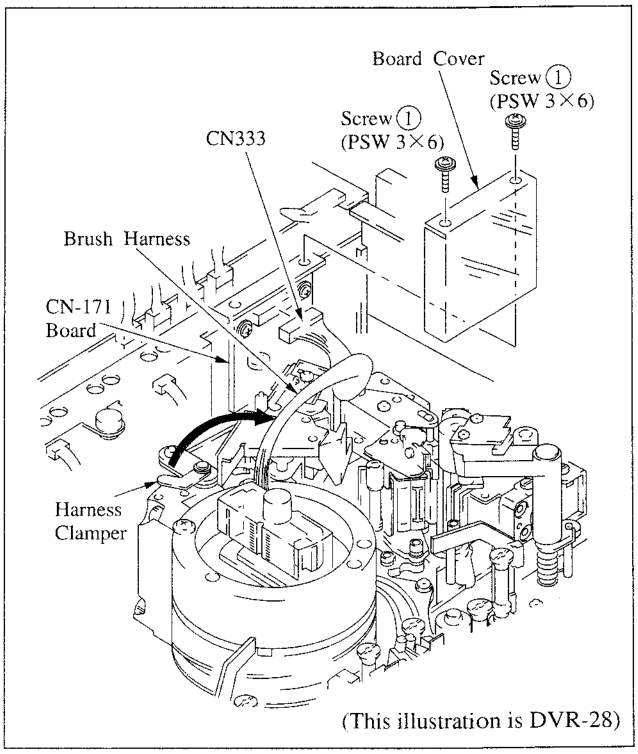

Board Cover
Screw ①
(PSW 3×6)
Screw ①
(PSW 3×6)
CN333
Brush Harness
CN-171 Board
Harness Clamper
(This illustration is DVR-28)

Fig.6-3-1 Brush Harness Removal

2. Brush Slip Ring Ass'y removal (Fig. 6-3-2)
   (1) Turn and remove Brash Slip Ring Ass'y in the direction indicated by arrow A while raising the SR stopper by hand.
   (2) Loosen two of screw ② fully, and remove the Brush Slip Ring Ass'y.
3. Mounting surface cleaning
   Clean the new Brush Slip Ring Ass'y to be replaced and the mounting surface of the drum with cleaning piece moistened with cleaning fluid. After cleaning, wipe them with dry cleaning piece two or three times.
4. Brush Slip Ring Ass'y installation
   Refer to step 15 of section 6-1-1.
5. Brush harness installation
   Install the brush harness in the reverse order of step 1.
6. Tracking check
   Refer to section 5-3.

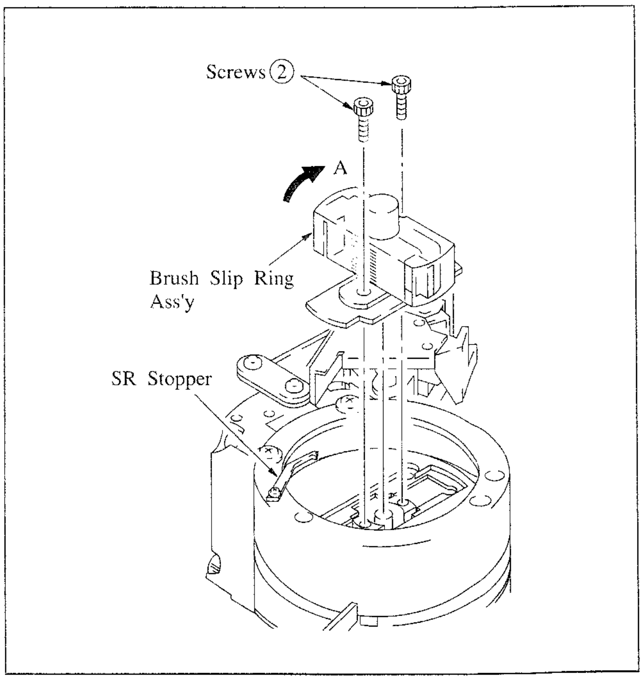

Screws ②
A
Brush Slip Ring Ass'y
SR Stopper

Fig.6-3-2 Brush Slip Ring Ass'y Removal

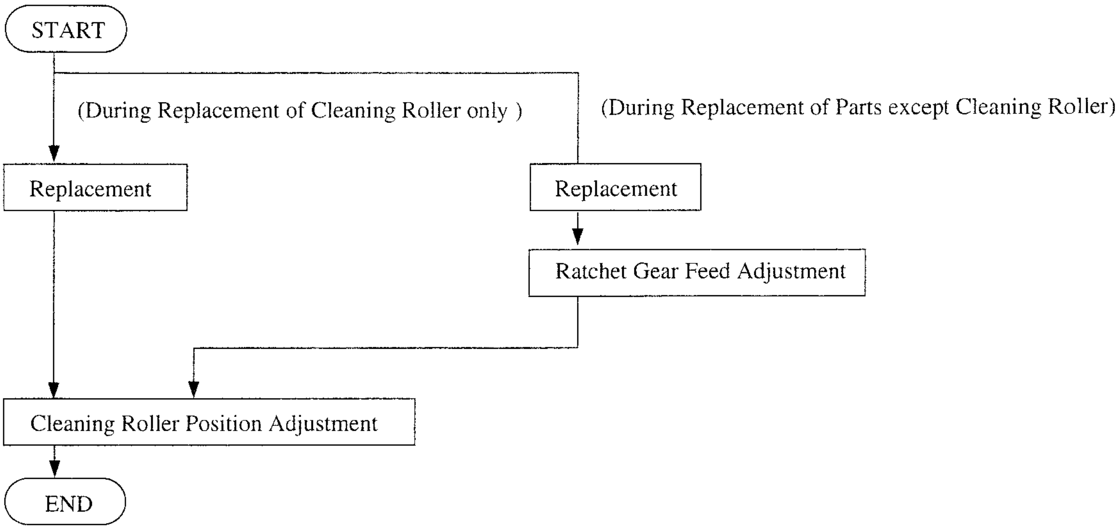
6-4. CLEANING ROLLER ASS'Y REPLACEMENT

Basic Knowledge

A. The Cleaning Roller that is a component part of the Cleaning Roller Ass'y is replaced periodically. Replace this part during periodical replacement.

B. Prepare the following tool for replacement:
- Thickness Gauge
  Sony Part No.: J-6041-670-A

C. The replacement flowchart is shown below:


START
(During Replacement of Cleaning Roller only)
(During Replacement of Parts except Cleaning Roller)
Replacement
Replacement
Ratchet Gear Feed Adjustment
Cleaning Roller Position Adjustment
END

Replacement

1. Cleaning Roller Ass'y removal (Fig. 6-4-1)
   (1) Remove two of screw ①, then remove the Cleaning Roller Ass'y from the drum holder.
   (2) Remove connector CN802 from the CN-309 board of the Cleaning Roller Ass'y.

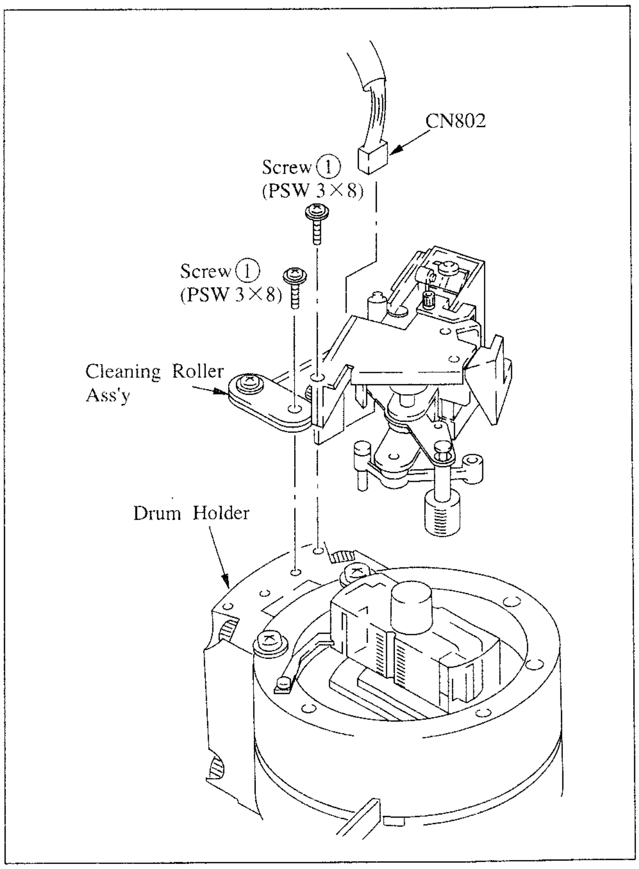

CN802
Screw ①
(PSW 3×8)
Screw ①
(PSW 3×8)
Cleaning Roller
Ass'y
Drum Holder

Fig. 6-4-1 Cleaning Roller Ass'y Removal

2. Cleaning Roller replacement/installation (Fig. 6-4-2)
   - To replace only the Cleaning Roller in the component part of the Cleaning Roller Ass'y, perform this step, then step 5.

   (1) Remove the shaft cap shown in the figure, then remove the Cleaning Roller.
   (2) Install the Cleaning Roller with the spacer block upward.
   (3) Install the Cleaning Roller Ass'y in the reverse order of step (1).

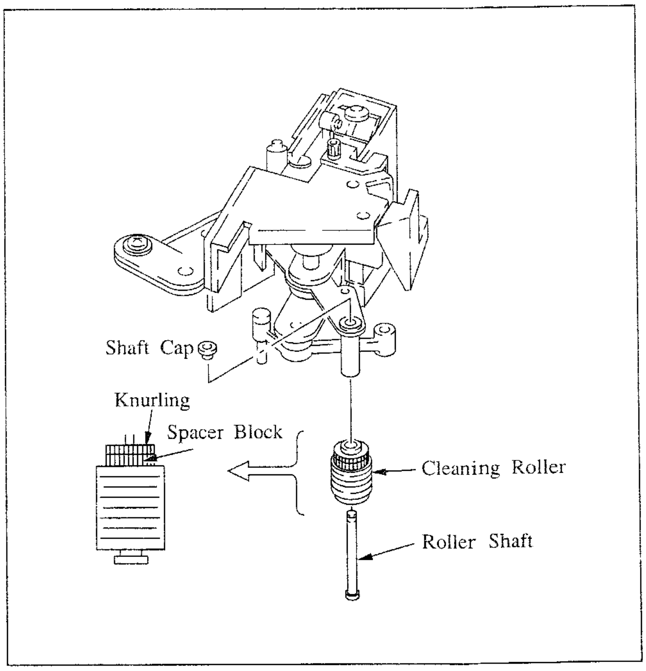

Shaft Cap
Knurling
Spacer Block
Cleaning Roller
Roller Shaft

Fig. 6-4-2 Cleaning Roller Replacement

3. Component part replacement (Component parts except Cleaning Roller)
   (1) Replace the component parts of the Cleaning Roller Ass'y in accordance with the procedure shown in the figure.
   - Unhook the C Press Arm Ass'y and Ratchet Drive Plate Ass'y shown in the figure when tension springs ① and ② are removed.

   Note: Never loosen screws ② and ③ shown in the figure.

   (2) Install the Cleaning Roller Ass'y in the machine in the reverse order of step (1) after replacement.

Assemble the parts in the reverse order.

Fig.1 Removal of plunger unit

Fig.3 Removal of drive arm unit

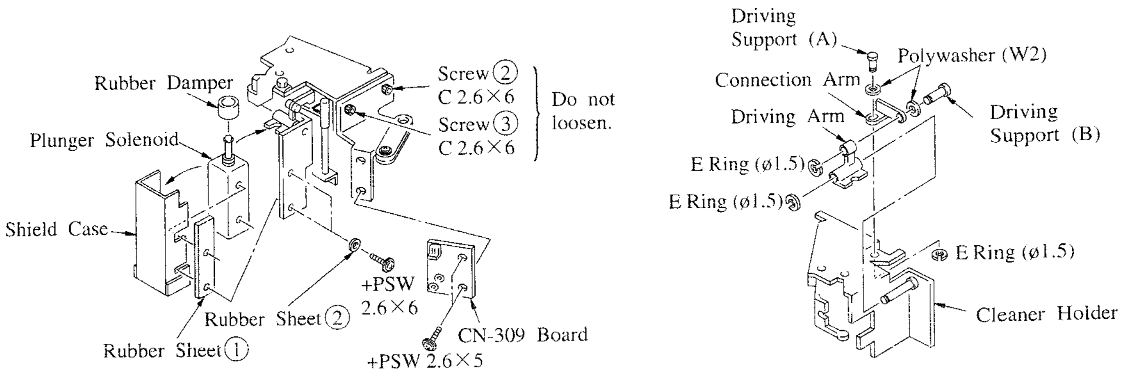

Rubber Damper
Plunger Solenoid
Shield Case
Rubber Sheet②
Rubber Sheet①
Screw②
C 2.6×6
Screw③
C 2.6×6
Do not loosen.
+PSW 2.6×6
CN-309 Board
+PSW 2.6×5
Driving Support (A)
Polywasher (W2)
Connection Arm
Driving Arm
Driving Support (B)
E Ring (ø1.5)
E Ring (ø1.5)
E Ring (ø1.5)
Cleaner Holder

Fig.2 Removal of cam unit

Fig.4 Removal of ratchet gear unit

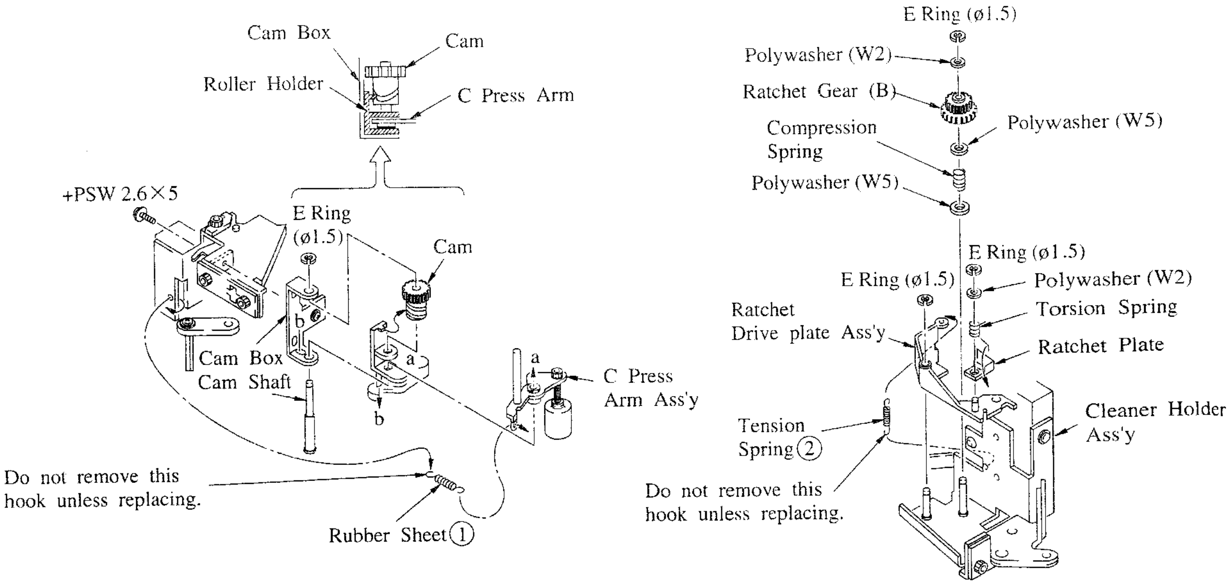

Cam Box
Cam
Roller Holder
C Press Arm
+PSW 2.6×5
E Ring (ø1.5)
Cam
b
a
Cam Box
Cam Shaft
a
b
C Press Arm Ass'y
Do not remove this hook unless replacing.
Rubber Sheet①
E Ring (ø1.5)
Polywasher (W2)
Ratchet Gear (B)
Compression Spring
Polywasher (W5)
Polywasher (W5)
E Ring (ø1.5)
E Ring (ø1.5)
Polywasher (W2)
Ratchet Drive plate Ass'y
Torsion Spring
Ratchet Plate
Cleaner Holder Ass'y
Tension Spring②
Do not remove this hook unless replacing.

Fig. 6-4-3 Cleaning Roller Ass'y Component Parts

4. Ratchet Gear feed adjustment (Fig. 6-4-4)
   (1) Turn the machine power on.
   (2) Mark the portion of the Racket Gear shown in the figure.
   (3) Press the keys on the control panel in the following sequence to the test mode of the Cleaning Roller is then entered.

   [BKDV-101]
   TEST , F6 (CHECKER) F1 (SP),
   F6 (F) , 2 , F8 , SET

   [BKDV-200 series]
   ① SHIFT + SET UP
   ② ENTRY + center key + search dial (or V key) to enter the <TEST> menu.
   Turn the search dial clockwise or press V key to select 807. [CHECKER MODE].
   ③ Press the > key to move the cursor to EXECUTE.
   ④ Press the ∧ key to enter the CHECKER mode.
   ⑤ Entry F28 by pressing the monitor select keys in the following sequence.
   INPUT CHECK + 5 (F), 2, 8, SET

   F can be input by selecting in the search dial and F1 (ALPH SET) key as well. (Refer to Section 6-(1)-4.)
   (4) Press the < key on the control panel to turn the Ratchet Gear clockwise. Align the marked portion of the Ratchet Gear with line A shown in the figure.
   (5) Go on pressing the < key on the control panel so that Cleaning Roller operates 30 times check it meet the following specification.
   Specification: The Ratchet Gear rotates 360 degrees and the marked portion of the Ratchet Gear exists between lines A and B.If the specification is met, perform steps 6 and later. If it is not, perform steps (6) and later.
   (6) Perform the adjustment below to meet the specification in step (5).
   - When the marked portion is placed in the counterclockwise direction against line A (the Racket Gear does not rotate 360 degrees)
     Loosen screw ① by 1/4 turn and move the stopper plate in the direction indicated by arrow C.
     After adjustment, tighten screw ①.
   - When the marked portion is placed in the clockwise direction against line B
     Loosen screw ① by 1/4 turn and move the stopper plate in the direction indicated by arrow D.
     After adjustment, tighten screw ①.
   (7) Reconfirm that the specification in step (5) is met.
   (8) Turn the machine power off.

5. Cleaning Roller position adjustment (Fig. 6-4-5)
   (1) Confirm that clearance A between the drum's side surface and Cleaning Roller meets the specification.
   Specification: 0.25 mm $\leqq$ A $\leqq$ 2.5 mm
   If the specification is not met, perform steps (2) and late.
   (2) Loosen screws ④ , ⑤ , and ⑥ by 1/4 turn.
   (3) Move the Cleaning Roller Ass'y in the direction indicated by arrow B and adjust so that the specification is met.
   (4) Tighten screws ④ , ⑤ , and ⑥ .
   (5) Reconfirm that the specification is met.

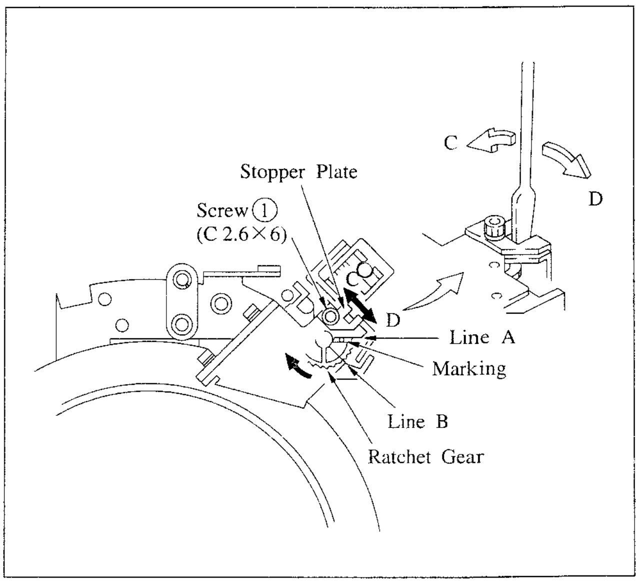


Fig. 6-4-4 Ratchet Gear Feed Adjustment

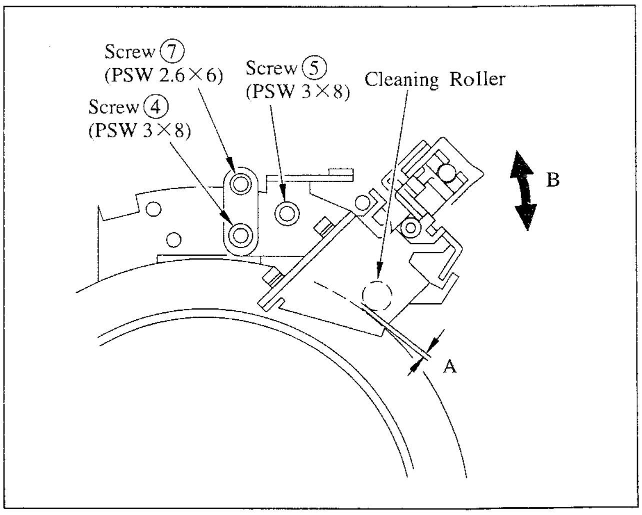


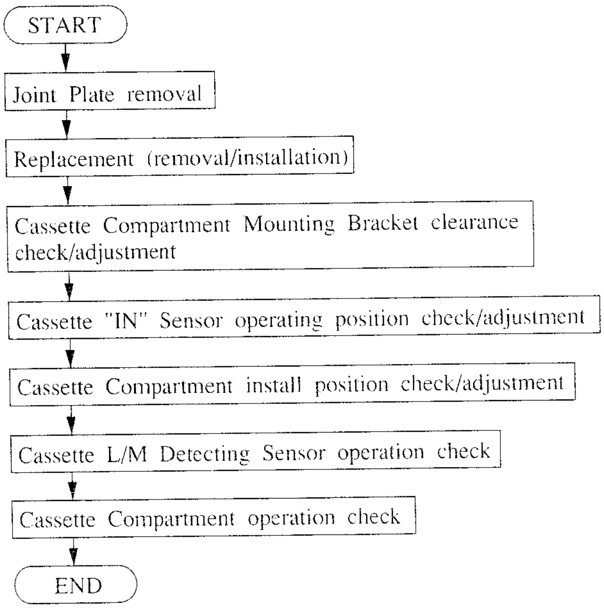
Fig. 6-4-5 Cleaning Roller Position Adjustment

6-5. CASSETTE COMPARTMENT ASS'Y REPLACEMENT

Basic Knowledge

A. The Cassette Compartment Ass'y can be removed by removing the top and front panels; however, when the assembly is to be replaced, the left- and right-side panels should also be removed because adjustments must be made. (Refer to Section 2-2 for the method for removing these panels.)

B. When the assembly is replaced, the checks and adjustments, shown in the following flowchart, must be performed.


START
Joint Plate removal
Replacement (removal/installation)
Cassette Compartment Mounting Bracket clearance check/adjustment
Cassette "IN" Sensor operating position check/adjustment
Cassette Compartment install position check/adjustment
Cassette L/M Detecting Sensor operation check
Cassette Compartment operation check
END

C. Prepare the following to perform the checks and adjustments after the replacement.

- Thickness gauge
  Sony Parts No. : J-6041-670-A
- Cleaning liquid (or the equivalent)
  Sony Parts No. : 9-919-573-00
- Cleaning piece (cloth or gauze)
  Sony Parts No. : 2-034-697-00
- Standard cassette tape: one each for
  D2S (small-size cassette), D2M (middle-size cassette), and
  D2L (large-size cassette)
- Locking compound (Screwlock)

D. Test menu setup procedure
The following explains how to set up the necessary test menu for replacing the Cassette Compartment.
When setting the test menu, remove the cassette tape from the unit.

BKDV-101

[Setting the Test Menu for Cassette Compartment]
Press the keys on the control panel in the following sequence:

Step (1): Set the checker test menu.

TEST , F6 (CHECKER), F1 (SP)

Step (2): Set the Cassette Compartment test mode "F22".

F6 (F), 2 , 2 , SET
("F22 CAS ALL" is displayed.)

Step (3): Operate the cursor key.
When the above settings have been completed, the Cassette Compartment will operate in the following manner according to the operation of the cursor key.

Cassette down mode

< : Shift to down operation only when this key is pressed.

< + □ : Automatically shift to the down position

Cassette up mode

< : Shift to the up operation only when this key is pressed.

□ + < : Automatically shift to the up position

[Canceling the Test Menu]
Carry out the one of the following steps.

① F6 (F) , 2 , 0 , SET
② F8 (=) , 0 , SET
③ Turn off the power

Or, turn off the power.

[Setting the Test Menu for Reel Shift]
Press the keys on the control panel in the following sequence:

Step (1): Set the checker test menu.

TEST , F6 (CHECKER), F1 (SP)

Step (2): Set the reel shift test mode "F21".

F6 (F), 2 , 1 , SET
("F21 RL SHT" is displayed.)

Step (3): Operate the cursor key.
When the above settings have been completed, the position of the reel position changes as described below according to the operation of the cursor key.

< or > : Shift to the M-cassette position

< + □ : Shift to the L-cassette position

□ + > : Shift the S-cassette position

BKDV-200 series

[Setting the Test Menu for Cassette Compartment]

Press the keys on the control panel in the following sequence:

Step (1): Set the checker test menu.

① SHIFT + SET UP (The HOME menu changes to the SCROLL menu.)
② ENTRY + center key + search dial (or V key) to enter the <TEST> menu.
Turn the search dial clockwise or press V key to select 807. [CHECKER MODE].
③ Press the cursor > key to move the cursor to EXECUTE.
④ Press the cursor Λ key to enter the CHECKER mode.

Step (2): Set the Cassette Compartment test mode "F22".

INPUT CHECK + 5 (F), 2, 2, SET
("F22 CAS ALL" is displayed.)

F can be input by selecting it the search dial and F1 (ALPH SET) key as well. (Refer to Section 6-(1)-4.)

Step (3): Operate the cursor key.
When the above settings have been completed, the Cassette Compartment operates in the following manner according to the operation of the cursor key.

Cassette down mode

< : Shift to down operation only when this key is pressed.

< + ☐ : Automatically shift to the down position.

Cassette up mode

< : Shift to up operation only when this key is pressed.

☐ + < : Automatically shift to the up position.

[Canceling the Test Menu]

Carry out the one of the following steps.

① INPUT CHECK + 5 (F), 2, 0, SET
② SHIFT, F4 (=), 0, SET
③ Turn off the power

[Setting the Reel Shift Test Menu]

Press the keys on the control panel in the following sequence:

Step (1): Set the checker test menu.

① $\boxed{\text{SHIFT}}$ + $\boxed{\text{SET UP}}$ (The HOME menu changes to the SCROLL menu.)
② $\boxed{\text{ENTRY}}$ + center key + search dial (or $\boxed{\vee}$ key) to enter the <TEST> menu.
Turn the search dial clockwise or press $\boxed{\vee}$ key to select 807. [CHECKER MODE].
③ Press the cursor $\boxed{>}$ key to move the cursor to EXECUTE.
④ Press the cursor $\boxed{\wedge}$ key to enter the CHECKER mode.

Step (2): Set the reel shift test mode "F21".

$\boxed{\text{INPUT CHECK}}$ + $\boxed{5}$ (F), $\boxed{2}$, $\boxed{1}$, $\boxed{\text{SET}}$
("F21 RL SHT" is displayed.)

F can be input by selecting it the search dial and $\boxed{\text{F1}}$ (ALPH SET) key as well. (Refer to Section 6-(1)-4.)

Step (3): Operate the cursor key.
When the above settings have been completed, the position of the reel changes in the following manner according to the operation of the cursor key.

$\boxed{<}$ or $\boxed{>}$: Shift to the M-cassette position

$\boxed{<}$ + □ : Shift to the L-cassette position

□ + $\boxed{>}$: Shift to the S-cassette position

[Canceling the Test Menu]

Carry out the one of the following steps.

① $\boxed{\text{INPUT CHECK}}$ + $\boxed{5}$ (F), $\boxed{2}$, $\boxed{0}$, $\boxed{\text{SET}}$
② $\boxed{\text{SHIFT}}$, $\boxed{\text{F4}}$ (=) , $\boxed{0}$, $\boxed{\text{SET}}$
③ Turn off the power

Removal

1. Joint Plate removal (Fig. 6-5-1)
   - Remove the two screws fixing the Joint Plate, then remove the Joint Plate.

2. Cassette Compartment Ass'y removal
   (1) Lift the USE Ass'y in the direction indicated by the arrow A. (Fig. 6-5-2)
   (2) Disconnect the CN356 connector from the SE-135 Board. (Fig. 6-5-2)
   (3) Disengage the CN356 harness from the harness clamp.
   (4) Remove the four screws fixing the Cassette Compartment Ass'y and then the Cassette Compartment Ass'y from the unit. (Fig. 6-5-3)

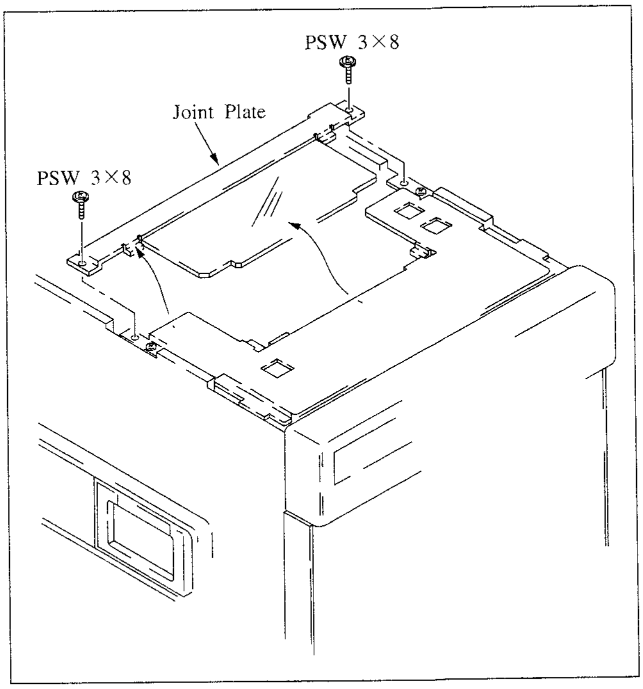

PSW 3×8
Joint Plate
PSW 3×8

Fig. 6-5-1 Joint Plate Removal

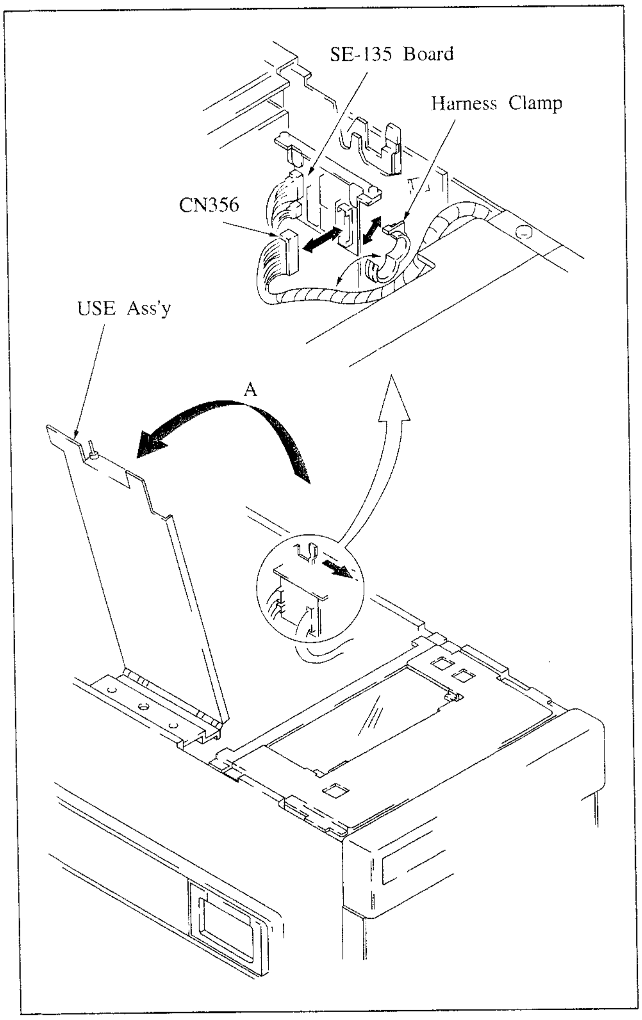

SE-135 Board
Harness Clamp
CN356
USE Ass'y
A

Fig. 6-5-2 Harness Removal

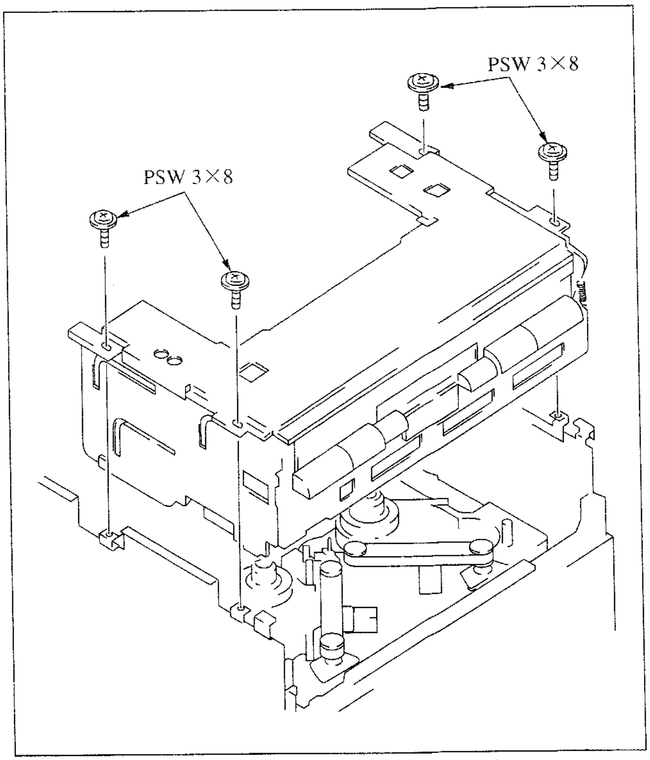

PSW 3×8
PSW 3×8

Fig. 6-5-3 Cassette Compartment Removal

Replacement/Installation

3. Perform the following procedure to replace and install the Cassette Compartment Ass'y:

   (1) Clean the surface on which the Cassette Compartment is to be installed, and also the bosses for the four base-plate positioning screws. (Fig. 6-5-4)
   (2) Lower the Cassette Compartment so that the four mounting holes fit securely on the base-plate positioning pins.
   (3) Insert harness CN356 into connector CN356 on the SE-135 Board. (Fig. 6-5-2)
   (4) Fix the CN356 harness with the harness clamp.

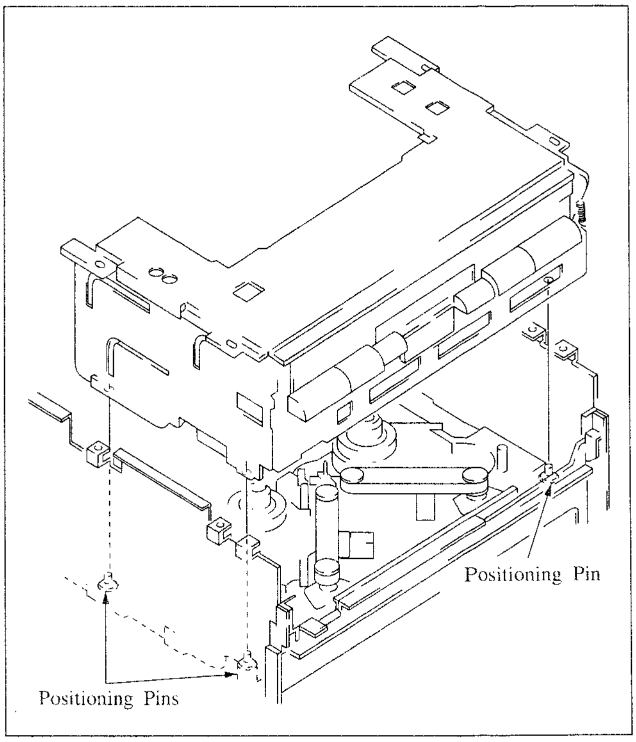


Fig. 6-5-4 Cassette Compartment Installation

Check/Adjustment

4. Cassette Compartment Mounting Bracket clearance check
   This check is done to detect any unacceptable clearance between the Cassette Compartment and its mounting brackets to prevent vertical play of the compartment.

   Check the clearance between the Cassette Compartment and its mounting brackets (L) and (R) (hereinafter (L) and (R) brackets) with a thickness gauge. (Fig. 6-5-5)

   Specification : 0.5-mm thickness gauge : Goes through.
   0.7-mm thickness gauge : Does not go through.

   If the above specification is satisfied, perform step 6 and the subsequent steps.
   If not, perform step 5 and the subsequent steps.

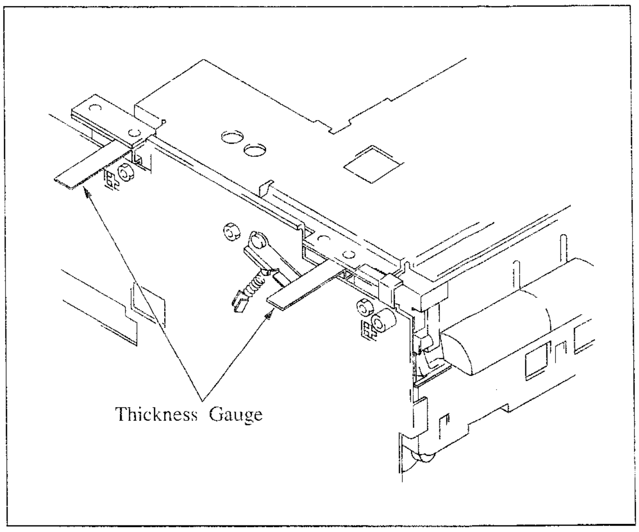


Fig. 6-5-5 Cassette Compartment Mounting Brackets Clearance Check

5. Cassette Compartment Mounting Bracket clearanse adjustment
   This adjustment applies to both the (L) and (R) brackets.

   (1) Loosen the three nuts that secure the (L) or (R) bracket. (Fig. 6-5-6)
   Use a 5.5-mm box wrench.
   (2) Insert a 0.6-mm thickness gauge into the space between the Cassette Compartment and the Cassette Compartment Mounting Bracket (L) (or R).
   (Fig. 6-5-7)
   (3) Press down the Cassette Compartment with a finger as shown in the figure, then insert a Philips screwdriver into the adjusting hole to adjust the height of the Cassette Compartment Mounting Bracket (L) (or R).
   After adjusting the height, tighten the three nuts that have been loosened in step (1).
   - Nut tightening procedure (Fig. 6-5-7)
     Tighten the three nuts in the order: ⓐ → ⓑ → ⓒ
     (See Figure 6-5-7 for the positions.)

   (4) Pull out the 0.6-mm thickness gauge.
   (5) Check that the clearance meets the specification.
   If the clearance does not meet the specification, restart the adjustment from the beginning.

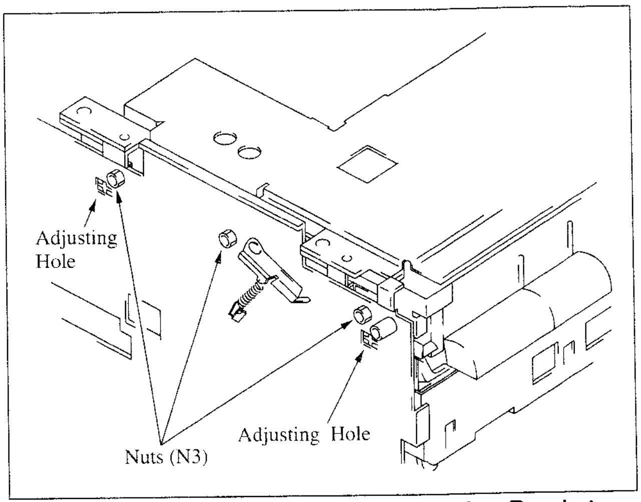


Fig. 6-5-6 Cassette Compartment Mounting Bracket Clearance Adjustment (1)

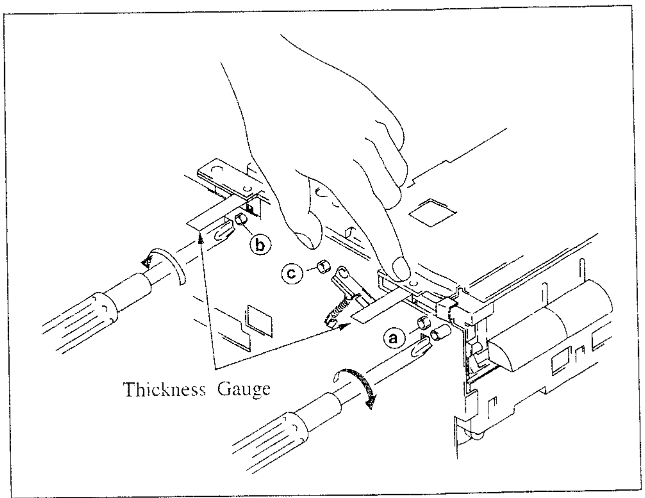


Fig. 6-5-7 Cassette Compartment Mounting Bracket Clearance Adjustment (2)

6. Secure the Cassette Compartment Ass'y to the unit by tightening the four screws removed in step 2. (Fig. 6-5-8)

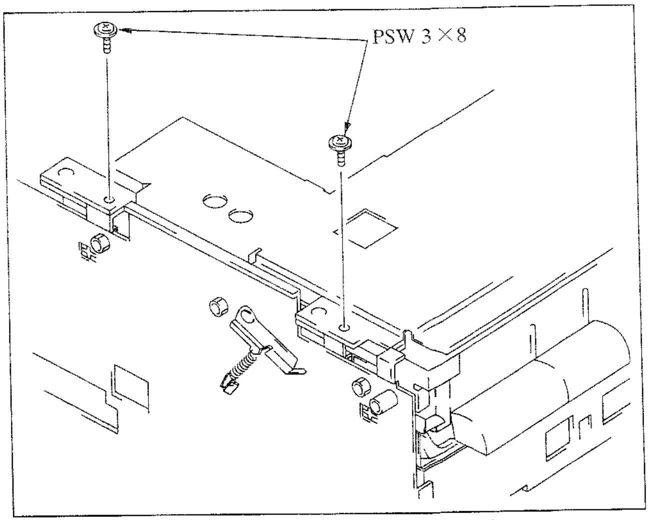


Fig. 6-5-8 Cassette Compartment Installation

7. Cassette IN Sensor operating position check
   The Cassette IN Sensor is a sensor for checking whether a cassette tape has been set in the Cassette Compartment.
   This check is performed to confirm that the Cassette IN Sensor is in the specified position. (Fig. 6-5-9)

   (1) Turn on the unit.
   (2) Select the test menu for the Cassette Compartment. Refer to Item D of the Basic Knowledge for the method to set up the test menu.
   (3) Insert a D2S-type S cassette tape so that it bumps against the bent portion inside the Cassette Compartment.
   (4) Press the cursor key to move the compartment to the position in which the checking in step (5) can be performed easily.
   (5) Insert each thickness gauge accurately between each bent portion of the cassette stopper (two positions at the left and right) in the Cassette Compartment and the cassette tape. Then, check the bit indication on the display. (Fig. 6-5-10)

xxxxx1xxB

└── Bit indication

Specifications;

Thickness gauge	Bit display
t 1.1 mm →	"0"
t 1.6 mm →	"1"

If the above specifications are satisfied, perform step 9 and the subsequent steps. If not, perform step 8 and the subsequent steps.

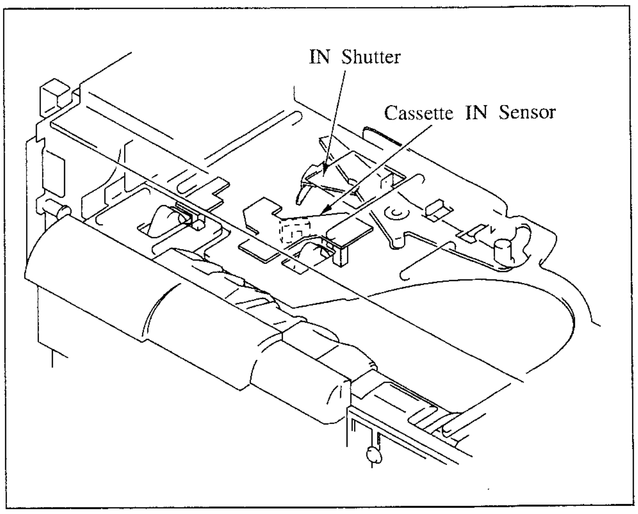


Fig. 6-5-9 Cassette IN Sensor

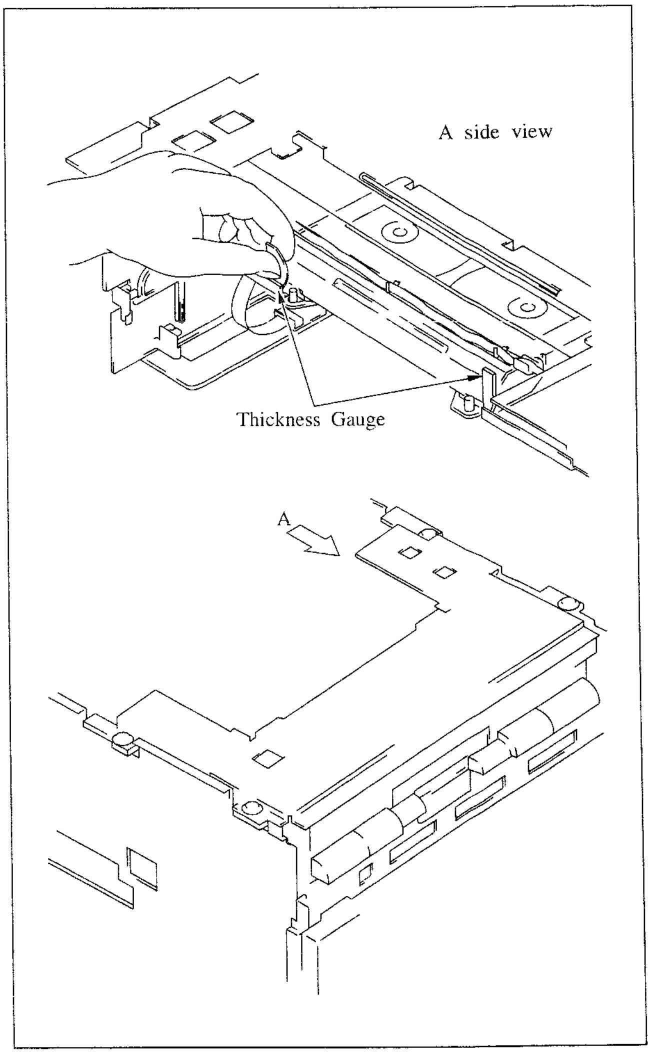


Fig. 6-5-10 Cassette IN Sensor Operating Position Check

8. Cassette IN Sensor operating position adjustment

   (1) Insert a Philips screwdriver (for 4-mm dia) into the square hole on the Cassette Compartment, then loosen the adjusting screw by an eighth of a turn to a quarter of a turn. (Fig. 6-5-11)
   (2) Insert a 1.25-mm thickness gauge between each bent portion of the cassette stopper (two positions at the left and right). (Fig. 6-5-12)
   (3) Insert the tip of the Philips screwdriver into the adjusting hole on the Cassette IN Shutter Plate while pressing the cassette tape with a finger in the direction indicated by arrow A.
   (4) While watching the bit indication of the display, turn the Philips screwdriver until the bit display changes from 1 to 0, then adjust the position of the Cassette IN Shutter Plate.

       How to adjust the position:
       First turn the Philips screwdriver clockwise an eighth of a turn. Then adjust the position by turning it counterclockwise.
   (5) After adjusting the position, tighten the adjusting screw.
   (6) Remove the 1.25-mm thickness gauge.
       Then insert the 1.1-mm and 1.6-mm thickness gauges into the clearance to confirm that the specifications in step 7 are satisfied.
       If the specifications are not satisfied, perform the adjustment again from step (1).
   (7) Remove the thickness gauges and the cassette tape from the Cassette Compartment.
   (8) Apply a small amount of the locking compound on the head of the adjusting screw.

9. Canceling the Test Menu.

   Refer to Item D of the Basic Knowledge.

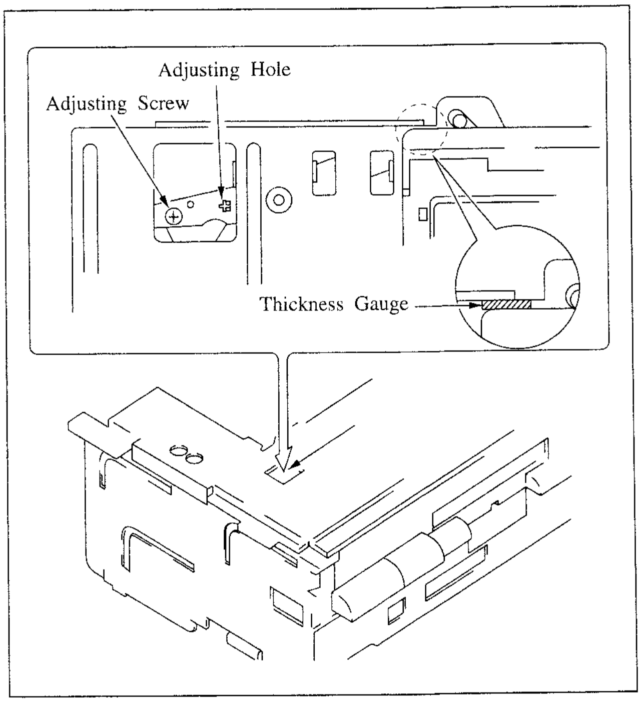


Fig. 6-5-11 Cassette IN Sensor Operating Position Adjustment (1)

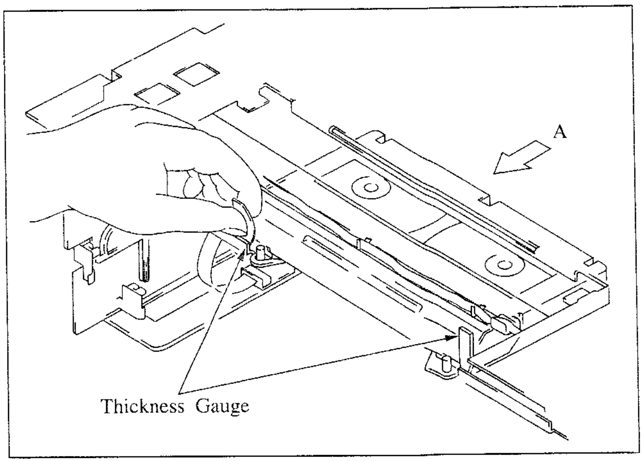


Fig. 6-5-12 Cassette IN Sensor Operating Position Adjustment (2)

10. Cassette Compartment installation position check
    A cassette tape is set on the reference pin on the reel table in the Cassette Compartment.
    This check is to confirm the installation position of the Cassette Compartment in relation to the position of the reference pin.

    (1) Select the test menu for shifting the reel.
        Press the cursor key to change the position of the reel to L (large cassette).
        Refer to Item D of the Basic Knowledge for the method to set up the test menu.
    (2) Select the test menu for the Cassette Compartment.
        Refer to Item D of the Basic Knowledge for the method to set up the test menu.
    (3) Insert a D2L-type L cassette tape into the Cassette Compartment.
    (4) Press the $\boxed{<}$ key on the control panel to set the Cassette Compartment to the "down" position.
    (5) Use the 0.2-mm and 0.5-mm thickness gauges to check the clearance between each bent portion (two positions at the left and right) of the Cassette Compartment and the cassette tape to confirm that the specification A is satisfied. (Fig. 6-5-13)

        Specification A: 0.2-mm thickness gauge: Can be inserted.
        0.5-mm thickness gauge: Cannot be inserted

        If the specification is satisfied, perform step 12 and the subsequent steps. If not, perform step 11 and the subsequent steps.

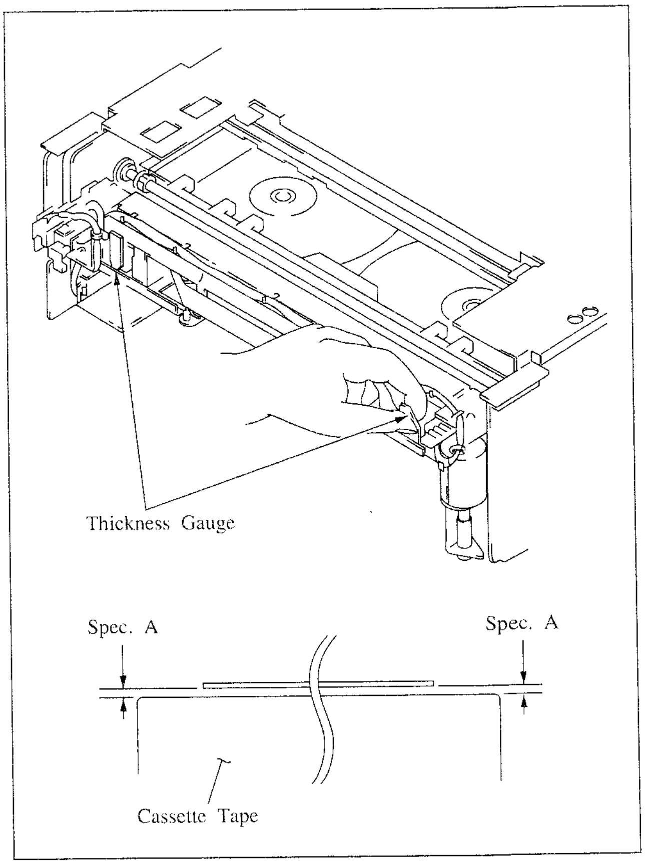


Fig. 6-5-13 Cassette Compartment Installation Position Check

11. Cassette Compartment installation position adjustment
    The Cassette Compartment installation position is adjusted by moving the positions of both positioning plates (L and R) that regulate the position of the Cassette Compartment on the reel table.

    (1) Loosen the four screws (PSW 3×8) (Cassette Compartment fixing screws) by turning them two or three turns.
    (2) Use a Philips screwdriver to turn four fixing screws (positioning plate fixing screws) a half to one turn. These screws are located in the holes on the left- and right-side plates (left-side plate: two square holes, right-side plate: two round holes). (Fig. 6-5-14)
    (3) Prepare two 0.35-mm thickness gauges (combination of 0.2-mm and 0.15-mm thickness gauges is also acceptable). Insert these gauges into the clearance at two positions between the bent portions of the cassette stopper (each at left and right) on the Cassette Compartment and the cassette tape. (Fig. 6-5-15)
    (4) Insert a Philips screwdriver into the adjusting hole of the positioning plate (L) or (R). Then adjust the position of the Cassette Compartment with the screwdriver so that the thickness gauges are securely inserted between the bent portions of the cassette stopper on the Cassette Compartment and the cassette tape. Tighten the four fixing screws after the adjustment.

        First adjust the position of the positioning plate (L) side and then go to the positioning plate (R) side.

    (5) Pull out the thickness gauges.
    (6) Tighten the four screws (PSW 3×8) to secure the Cassette Compartment.
    (7) Press the [>] key on the control panel to eject the cassette tape.
        Reinsert the cassette tape, then press the [<] key to set the Cassette Compartment to the "down" position.
    (8) Check that the specification A in step 10 is satisfied. If not, perform the adjustment again from the beginning.
    (9) Apply a small amount of the locking compound on the heads of the four fixing screws.

12. Press the [>] key on the control panel to eject the cassette tape.
13. Canceling the Test Menu.

    Refer to Item D of the Basic Knowledge.

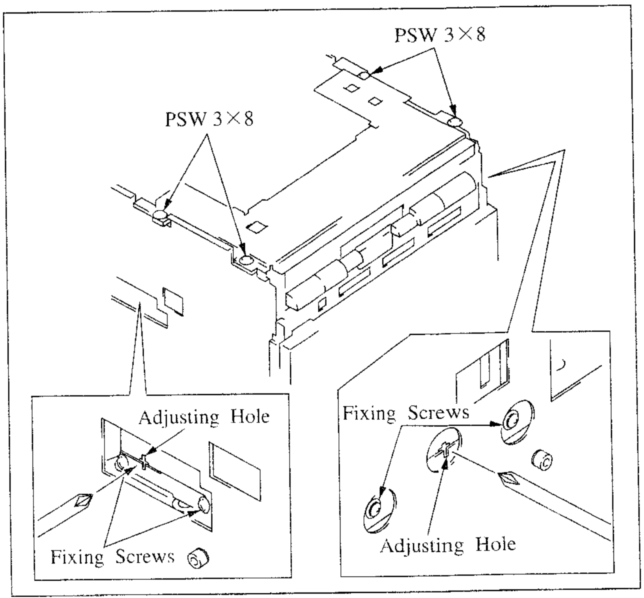


Fig. 6-5-14 Cassette Compartment Installation Position Adjustment (1)

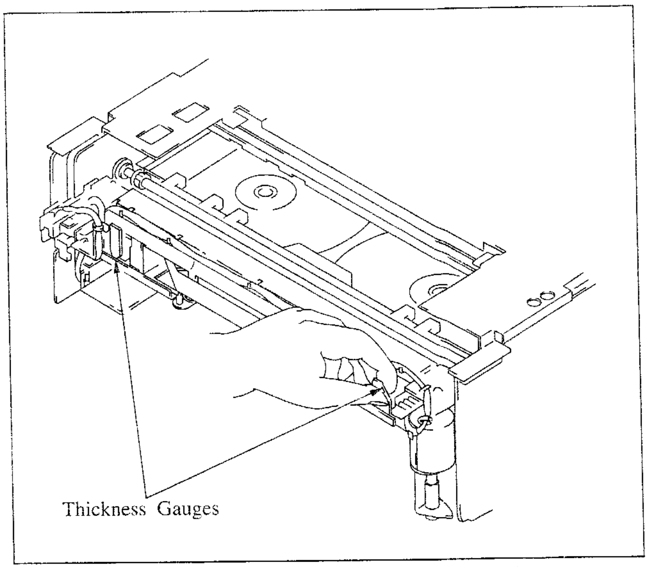


Fig. 6-5-15 Cassette Compartment Installation Position Adjustment (2)

14. Cassette L/M Detecting Sensor operation check
    The Cassette Detecting Sensor uses a photo interrupter as a detector. There are two types of detecting sensors: the L detecting sensor and the M detecting sensor.
    The following shows the combination of setting each sensor to detect each type of cassette. (Fig. 6-5-16)

    For S cassette: M detecting sensor: OFF
    L detecting sensor: OFF

    For M cassette: M detecting sensor: ON
    L detecting sensor: OFF

    For L cassette: L detecting sensor: ON

(1) Select the test menu for the Cassette Compartment. Refer to Item D of the Basic Knowledge for the method to set up the test menu.

(2) Confirm that the following specifications are satisfied when each of the M and L detecting sensors located in each position of the Cassette Compartment shown in the figure below is pressed with a finger. (Fig. 6-5-17)

Specifications: Confirm that the bit indication of the display is as follows:

- M detecting sensor: 010111$\underline{\underline{1}}$0B

  Confirm that the bit is set to 1 when the detecting sensor is pressed and then to 0 when it is released.

- L detecting sensor: 0101110$\underline{\underline{1}}$B

  Confirm that the bit is set to 1 when the detecting sensor is pressed and then to 0 when released.

If the above specifications are not satisfied, perform the following checks:

- Check the connection and the conductivity of each detecting sensor.
- Check the operation of each detecting sensor and shutter plate.
- Remove the dust from the light-emitting and -receiving sections of the photo interrupter.

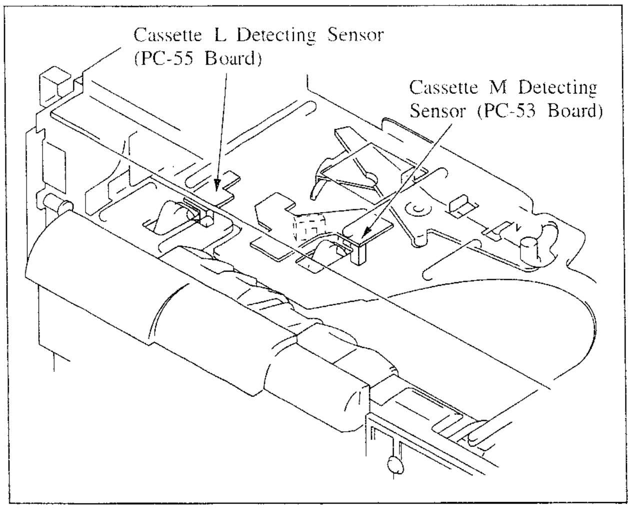

Cassette L Detecting Sensor (PC-55 Board)
Cassette M Detecting Sensor (PC-53 Board)

Fig. 6-5-16 **Cassette L/M Detecting Sensors**

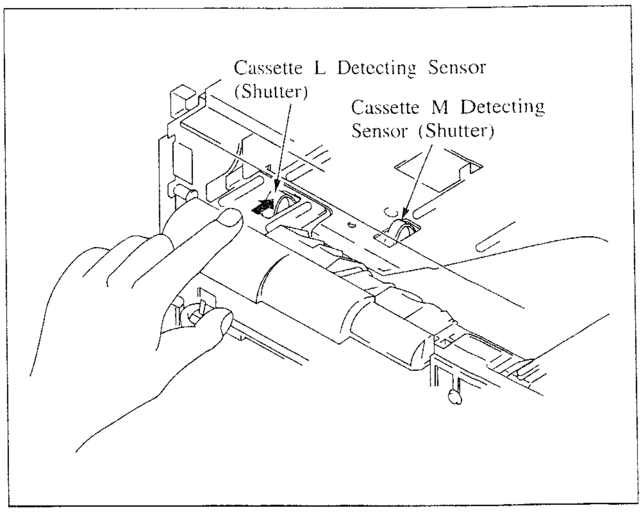

Cassette L Detecting Sensor (Shutter)
Cassette M Detecting Sensor (Shutter)

Fig. 6-5-17 **Cassette L/M Detecting Sensors Operation Check**

15. Canceling the Test Menu.

    Refer to Item D of the Basic Knowledge.

16. Cassette Compartment operation check
    Insert a D2L-, D2M-, and D2S-type cassette tape into the Cassette Compartment one by one and check the following points:
    - Check whether the Cassette Compartment operates normally.
    - Check whether the tape runs normally.

17. Eject the cassette tape from the unit.

6-6. CASSETTE COMPARTMENT COMPONENT REPLACEMENT

Basic Knowledge

A. Replacement of Cassette Compartment component is explained in accordance with the procedure below.

6-6-1. Cassette Compartment Component Replacement (1)
This section describes the replacement of the components that can be replaced without disassembling the Cassette Compartment.

6-6-2. Cassette Compartment Component Replacement (2)
This section describes the replacement of the components that can be replaced by disassembling the Cassette Compartment.

6-6-3. Adjustment during Cassette Compartment Component Replacement
This section describes the adjustment required during component replacement.

B. The components of the Cassette Compartment are replaced after the Cassette Compartment Ass'y is removed from the unit. After the components are replaced, check the items in Basic Knowledge B of Section. 6-5, "Cassette Compartment Ass'y Replacement" to install the Cassette Compartment Ass'y in the unit.

C. Prepare the following tools for adjustment during replacement:

- Thickness gauge
  Sony Parts No.: J-6041-670-A
- Wire gauge
  Sony Parts No.: J-6152-450-A
- Molyton grease
  Sony Parts No.: 7-662-001-41

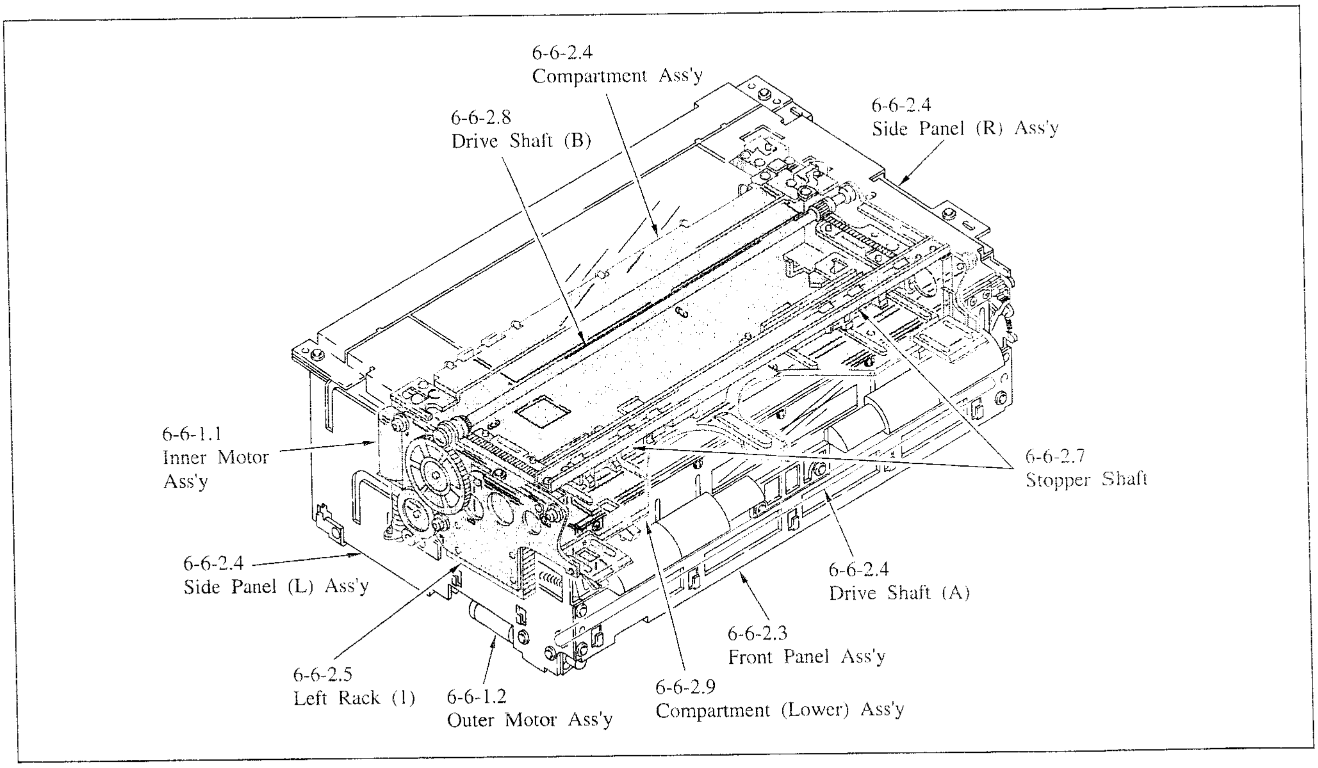

6-6-2.4
Compartment Ass'y
6-6-2.8
Drive Shaft (B)
6-6-2.4
Side Panel (R) Ass'y
6-6-1.1
Inner Motor Ass'y
6-6-2.7
Stopper Shaft
6-6-2.4
Side Panel (L) Ass'y
6-6-2.4
Drive Shaft (A)
6-6-2.3
Front Panel Ass'y
6-6-2.5
Left Rack (1)
6-6-1.2
Outer Motor Ass'y
6-6-2.9
Compartment (Lower) Ass'y

Fig. 6-6-1 Cassette Compartment Components

6-6-1. Cassette Compartment Component Replacement (1)

Basic Knowledge

The replacement of the components that can be replaced without disassembling the Cassette Compartment is described below.

1. Inner Motor Ass'y replacement

   (1) Turn an Outer Motor Wheel shown in Fig. 6-6-2 and move the Compartment Ass'y to the position in which two screws can be removed from the two holes of a top plate.
   (2) Cut two harness clamps fixing harnesses to an Inner Motor Ass'y using cutting pliers.
   (3) Turn an Inner Motor Wheel in the direction indicated by the arrow and release a limiter spring.
   (4) Insert a screwdriver in the round holes of the top plate, then remove two screws.
   Remove the Inner Motor Ass'y from the Compartment Ass'y.

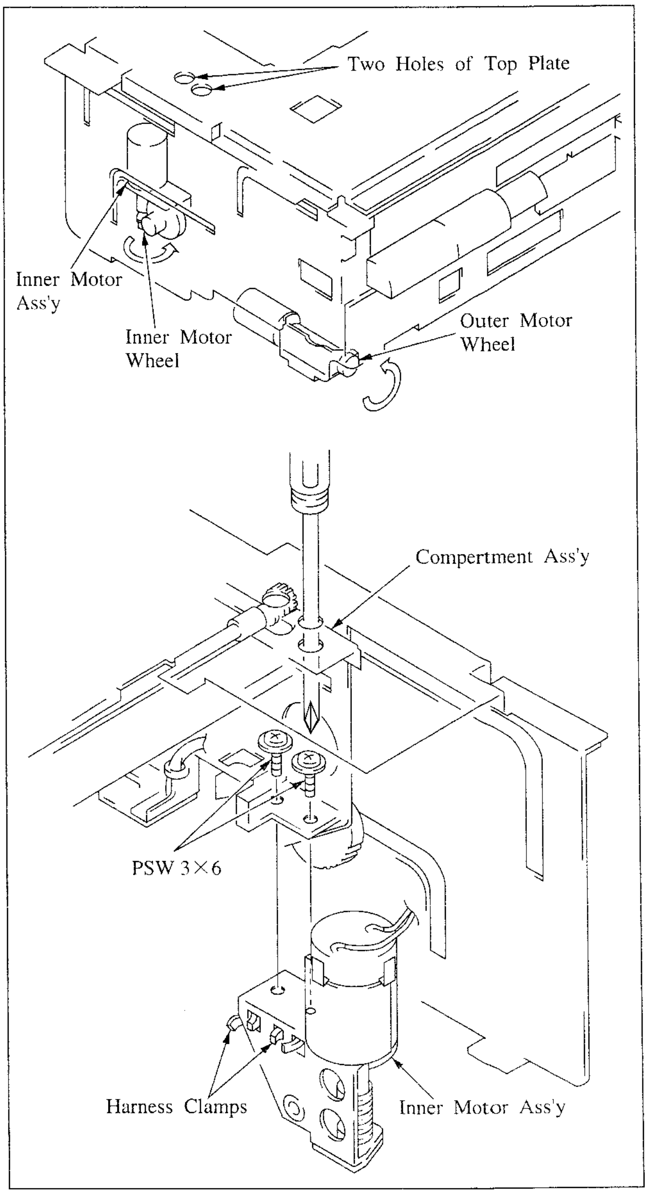

Two Holes of Top Plate
Inner Motor Ass'y
Inner Motor Wheel
Outer Motor Wheel
Compertment Ass'y
PSW 3×6
Harness Clamps
Inner Motor Ass'y

Fig. 6-6-2 Inner Motor Ass'y Replacement (1)

(5) Inner Motor Ass'y and component replacement (Fig. 6-6-3)

[Gear ① replacement]

Remove E ring ⓐ, remove gear ① from the Motor Bracket, and replace gear ①.

[Inner Motor replacement]

①Disconnect two lead wires connected to the motor using a soldering iron.

②Loosen two setscrews fixed to the Worm Joint and remove two screws (C 3×6), and then, replace the Inner Motor.

[Worm Gear ass'y replacement]

①Loosen two setscrews fixed to the Worm Joint. Remove two screws (C 3×6), then remove Inner Motor from the Motor Bracket.

②Loosen two setscrews fixed to the Drive Wheel, then remove the Drive Wheel.

③Remove the Worm Gear Ass'y (A), then remove E ring ⓑ.

④Replace the required components of the Worm Gear Ass'y.

Cautions during assembling

- Pay attention to the label direction when installing a motor.
- Pay attention to the polarity when solering the lead wires to the motor.
  Yellow lead wire : Positive (+)
  Purple lead wire : Negative (–)
- Smear Molyton grease slightly to each Gear Ass'y after compo-nents are replaced.
- Inner Worm Joint clearance adjustment is required when the Inner Motor and Worm Gear Ass'y components are replaced.
- Gear (1)/(2) clearance adjustment is required when the Inner Motor Ass'y is installed in the Compartment Ass'y.
  For the above adjustment, refer to Section. 6-6-3, "Adjustment during Cassette Compartment Component Replacement."

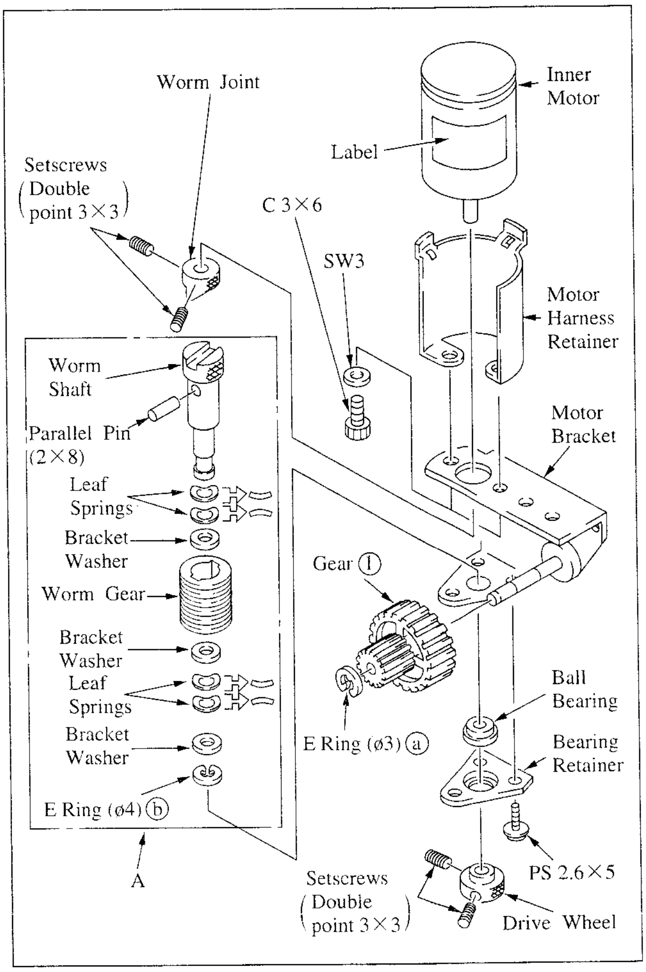

Worm Joint
Inner Motor
Label
Setscrews (Double point 3×3)
C 3×6
SW3
Motor Harness Retainer
Worm Shaft
Parallel Pin (2×8)
Motor Bracket
Leaf Springs
Bracket Washer
Worm Gear
Gear ①
Bracket Washer
Leaf Springs
Ball Bearing
Bracket Washer
E Ring (ø3) ⓐ
Bearing Retainer
E Ring (ø4) ⓑ
A
Setscrews (Double point 3×3)
PS 2.6×5
Drive Wheel

Fig. 6-6-3 Inner Motor Ass'y Replacement (2)

2. Outer motor ass'y replacement

   (1) Bend two hooks on a side panel (L) shown in Fig. 6-6-4 using pliers and remove the harness (CCS-11).
   (2) Turn an Outer Motor Wheel in the direction indicated by the arrow and release the limiter spring. .
   (3) Remove two screws fixing the Outer Motor Ass'y, then remove the Outer Motor Ass'y from the Compartment Ass'y.
   (4) Replace Outer Motor Ass'y components. (Fig. 6-6-5)

[Outer Motor replacement]

(1) Disconnect two lead wires connected to the motor using a soldering iron.
(2) Loosen two setscrews fixed to the Worm Joint, and remove two screws (C 3×5), and then replace the Outer Motor.

[Worm Gear ass'y replacement]

(1) Loosen two setscrews fixed to the Worm Joint. Remove two screws (C3×5), then remove the Outer Motor from the Motor Bracket A.
(2) Loosen two setscrews fixed to the Drive Wheel, then remove the Drive Wheel.
(3) Remove the Worm Gear Ass'y (Ass'y A), then remove E ring (2).
(4) Replace the required components of the Worm Gear Ass'y.

Cautions during assembling

- Pay attention to the label direction when installing a motor.
- Pay attention to the polarity when soldering the lead wires to the motor.
  Orange lead wire: Positive (+)
  Blue lead wire : Negative (–)
- Smear Molyton grease slightly to each Gear Ass'y after components are replaced.
- Outer Worm Joint clearance adjustment is required when Outer Motor Ass'y and Worm Gear Ass'y components are replaced.
- Worm Gear clearance adjustment is required when the Outer Motor Ass'y is installed in the Compartment Ass'y.
  For the above adjustment, refer to Section. 6-6-3, "Adjustment during Cassette Compartment Ass'y Replacement."

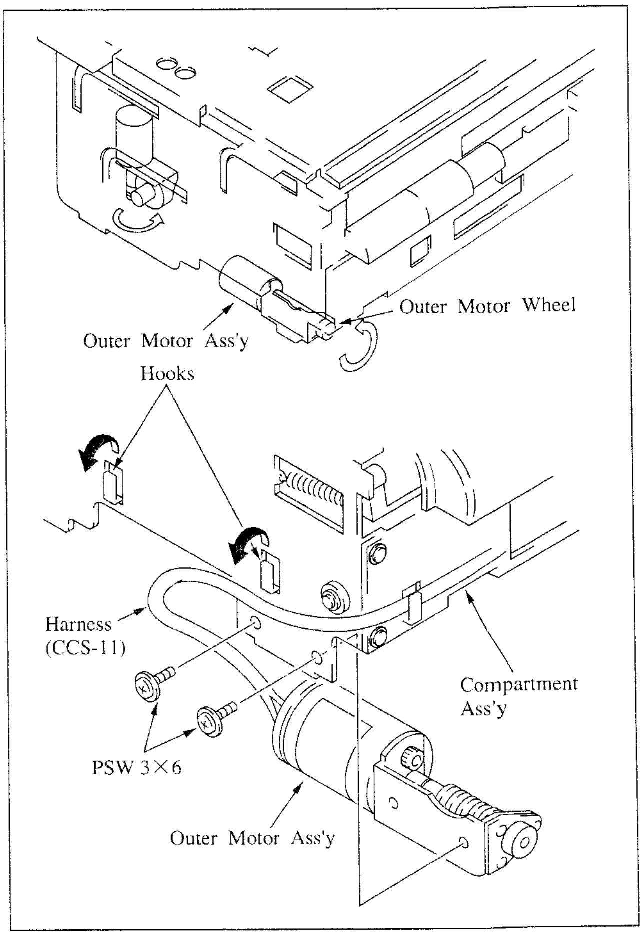

Outer Motor Wheel
Outer Motor Ass'y
Hooks
Harness (CCS-11)
Compartment Ass'y
PSW 3×6
Outer Motor Ass'y

Fig. 6-6-4 Outer Motor Ass'y Replacement (1)

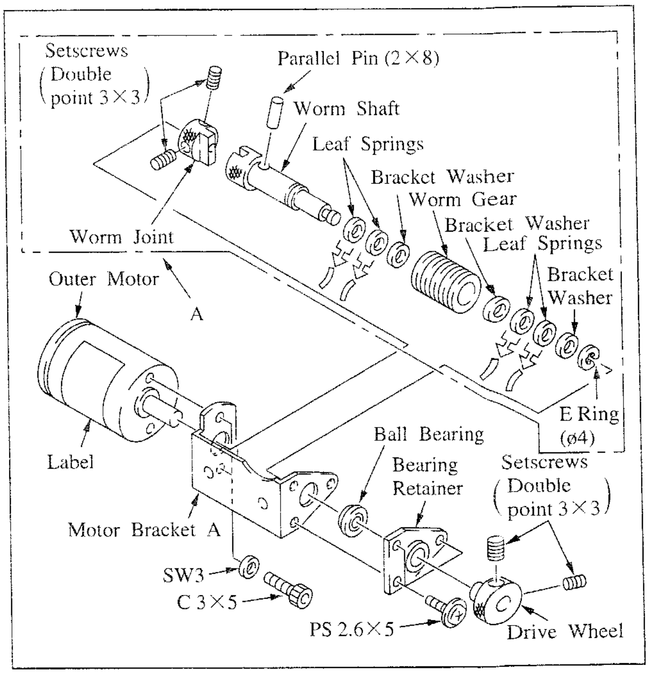

Setscrews (Double point 3×3)
Parallel Pin (2×8)
Worm Shaft
Leaf Springs
Bracket Washer
Worm Gear
Bracket Washer
Leaf Springs
Bracket Washer
Worm Joint
Outer Motor
A
E Ring (ø4)
Ball Bearing
Bearing Retainer
Setscrews (Double point 3×3)
Label
Motor Bracket A
SW3
C 3×5
PS 2.6×5
Drive Wheel

Fig. 6-6-5 Outer Motor Ass'y Replacement (2)

3. Flexible Card Wire replacement (Fig. 6-6-6)
   Two Flexible Card Wires are used on the back of the Cassette Compartment Ass'y.

   (1) Turn the Cassette Compartment upside down.
   (2) Remove the Flexible Card Wires and replace them. Refer to Section 2-5-4, "Flexible Card Wire Replacement."

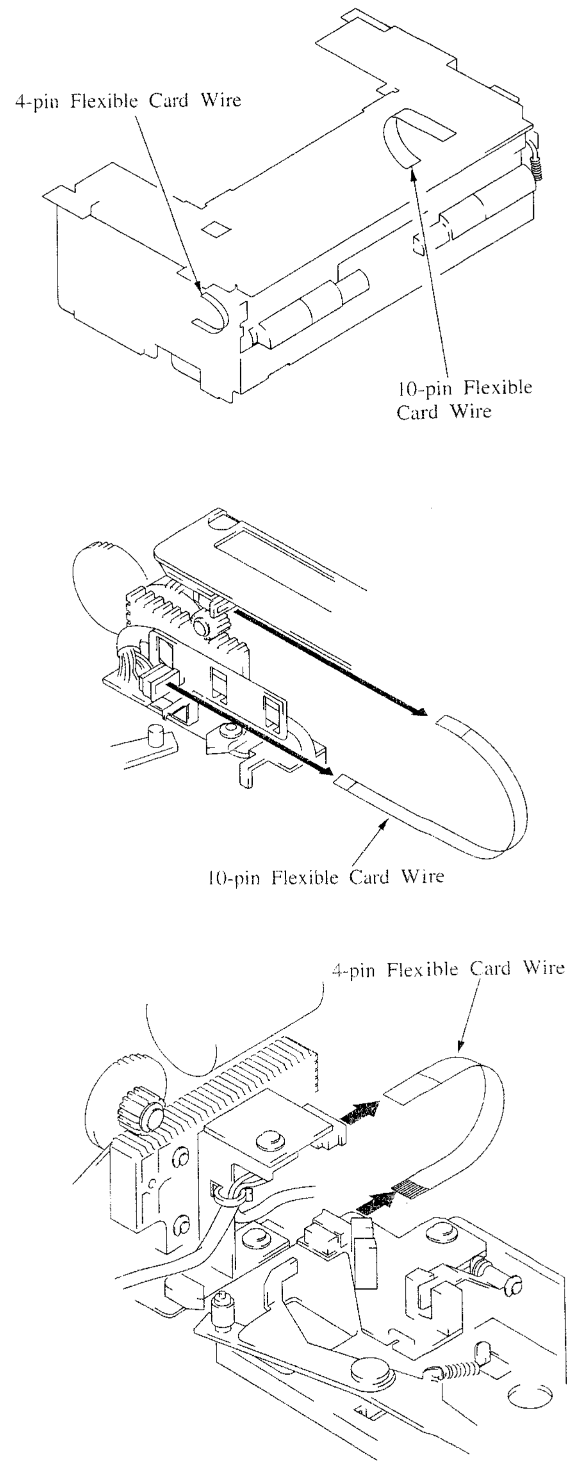

4-pin Flexible Card Wire
10-pin Flexible Card Wire
10-pin Flexible Card Wire
4-pin Flexible Card Wire

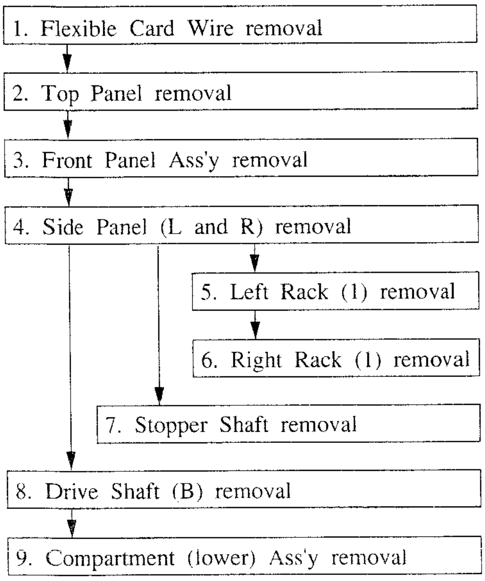
Fig. 6-6-6 Flexible Card Wire Replacement

6-6-2. Cassette Compartment Component Replacement (2)

Basic Knowledge

A. This section describes the replacement of the components that can be replaced by disassembling the Cassette Compartment Ass'y.
Replace the required components in accordance with the disassembly procedure below. For the disassembly procedure, refer to Maintenance Manual Vol-2, Section 21 (P21-15).

B. The replacement flowchart is shown below.


1. Flexible Card Wire removal
2. Top Panel removal
3. Front Panel Ass'y removal
4. Side Panel (L and R) removal
5. Left Rack (1) removal
6. Right Rack (1) removal
7. Stopper Shaft removal
8. Drive Shaft (B) removal
9. Compartment (lower) Ass'y removal

1. Flexible Card Wire removal
Refer to step 3 of Section 6-6-1.

2. Top panel removal (Fig. 6-6-7)

   (1) Remove two screws fixing the Joint Plate, then remove the Joint Plate in the direction indicated by arrow A.
   (2) Remove two screws fixing the Top Panel, then remove the Top Panel.

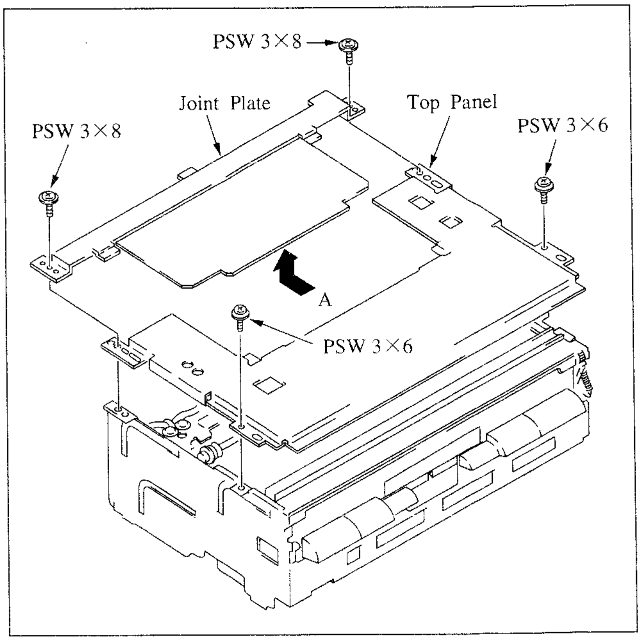

PSW 3×8
Joint Plate
Top Panel
PSW 3×8
PSW 3×6
A
PSW 3×6

Fig. 6-6-7 Top Panel Removal

3. Front Panel ass'y removal (Fig. 6-6-8)

    (1) Bend the five hooks on the Front Panel Ass'y using pliers and remove the harness (CCS-11).

    (2) Cut the harness clampe using a nipper.

    (3) Remove the four screws fixing the Front Panel Ass'y, then remove the Front Panel Ass'y from the Side Panels (L and R).
    The component below can be replaced in this step.
    - Front Panel Ass'y (This component is replaced in blocks.)

4. Side Panel (L and R) removal (Fig. 6-6-9)

    (1) Remove E ring and bearing (A) on the Side Panel (R) fixing Cassette Compartment Drive Shaft (A).

    (2) Hold the Compartment Ass'y by hand and remove the Cassette Compartment Lid Ass'y, Side Panel (R), and Side Panel (L).
    The components below can be replaced in this step.
    - Drive shaft (A)
    - Gears on Side Panels (L and R)
    - Gears installed in the Compartment Ass'y

Cautions during assembling

- Smear Molyton grease slightly to each Gear Ass'y after components are replaced.

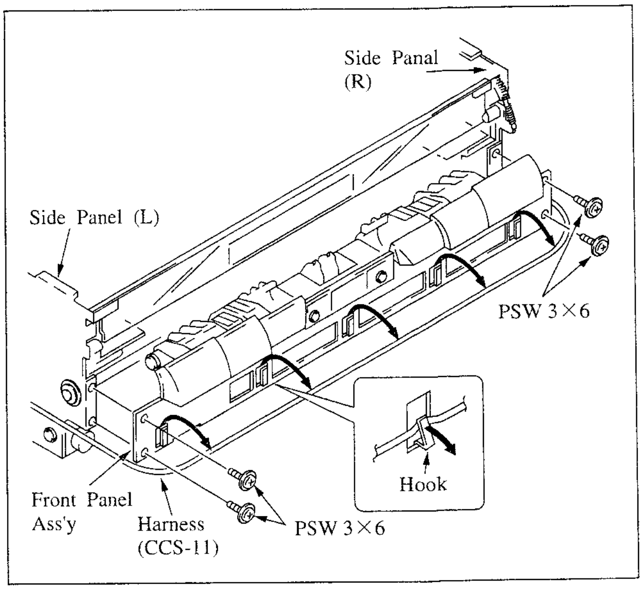

Side Panal (R)
Side Panel (L)
PSW 3×6
Hook
Front Panel Ass'y
Harness (CCS-11)
PSW 3×6

Fig. 6-6-8 Front Panel Ass'y Replacement

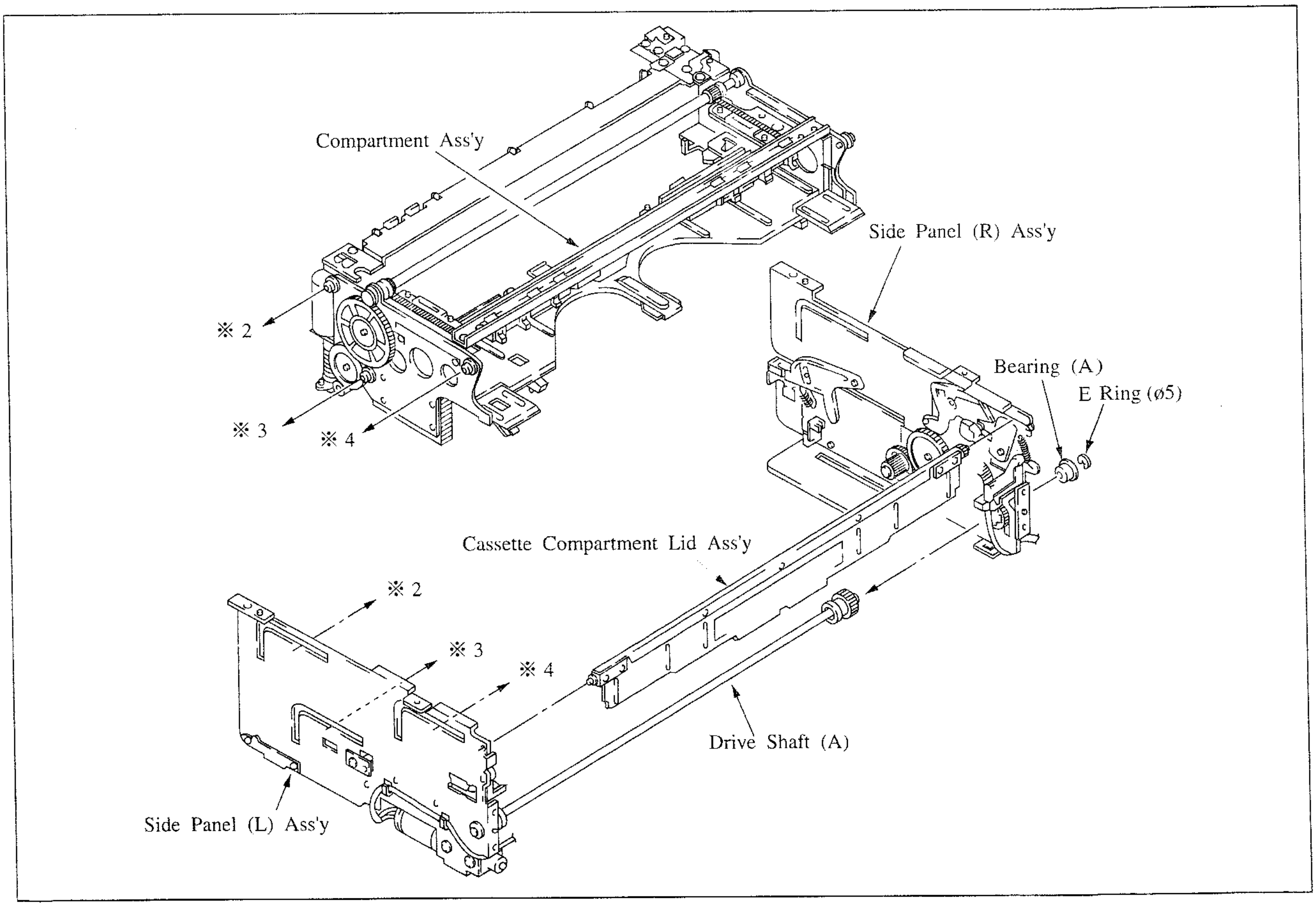

Compartment Ass'y
※ 2
※ 3
※ 4
Side Panel (R) Ass'y
Bearing (A)
E Ring (ø5)
Cassette Compartment Lid Ass'y
※ 2
※ 3
※ 4
Drive Shaft (A)
Side Panel (L) Ass'y

Fig. 6-6-9 Side Panel (L and R) Removal

5. Left Rack (1) removal (Fig. 6-6-10)

   (1) Turn the Compartment Ass'y upside down.
   (2) Remove a screw fixing the PC-52 Board, then remove the PC-52 Board.
   (3) Remove two screws fixing the Board Bracket (A) and PC-55 Board, then remove the Board Bracket (A) and PC-55 Board.
   (4) Remove four E rings, then remove the Left Rack (1).

   Note: Compression springs are also removed when the Left Rack (1) is removed. Be careful not to lose the compression springs.

   The components below can be replaced in this step.
   - Left Rack (1)
   - Compression springs

Cautions during assembling

- Smear Molyton grease slightly to the Left Rack Gear Ass'y and the four shafts shown in the figure after component are replaced.

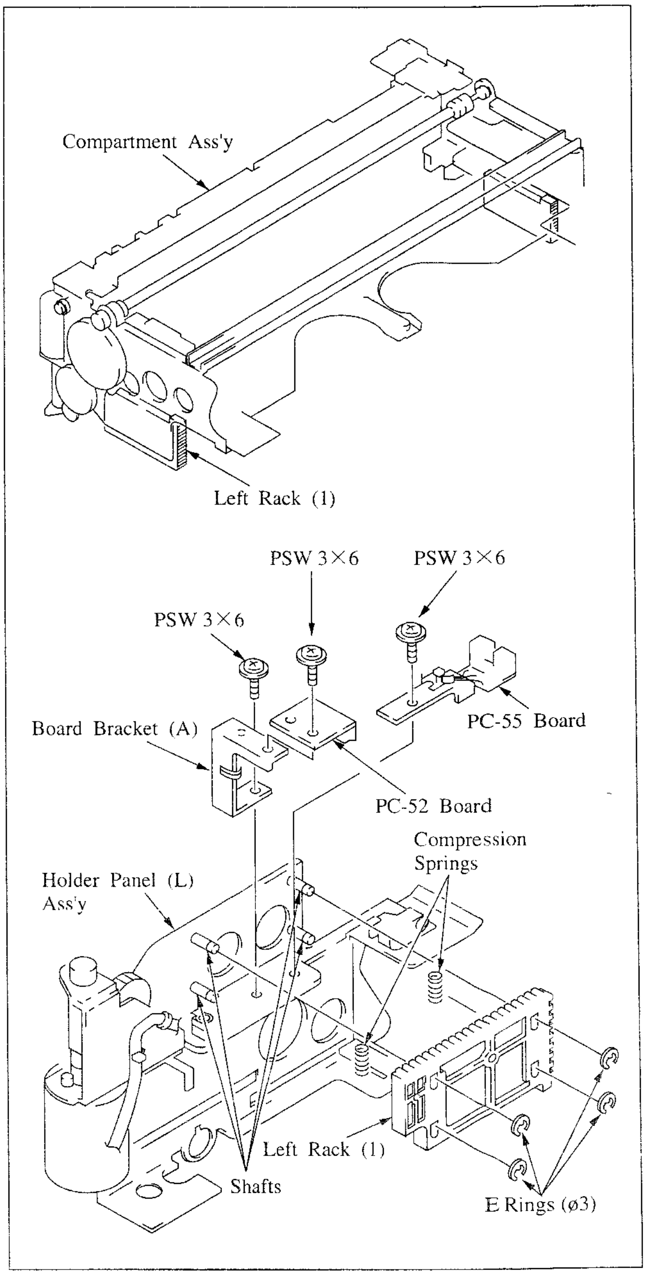

Compartment Ass'y
Left Rack (1)
PSW 3×6
PSW 3×6
PSW 3×6
Board Bracket (A)
PC-55 Board
PC-52 Board
Compression Springs
Holder Panel (L) Ass'y
Left Rack (1)
Shafts
E Rings (ø3)

Fig. 6-6-10 Left Rack (1) Removal

6. Right Rack (1) removal (Fig. 6-6-11)

(1) Turn the Compartment Ass'y upside down.
(2) Remove a screw fixing the PC-51 Board, then remove the PC-51 Board.
(3) Remove two screws fixing the Board Bracket (B), then remove the Board Bracket (B).
(4) Remove four E rings, then remove the Right Rack (1).

Note: Compression springs are also removed when the Right Rack (1) is removed. Be careful not to lose the compression springs.

The components below can be replaced in this step.
- Right Rack (1)
- Compression springs

Cautions during assembling

- Smear Molyton grease slightly to the Right Rack Gear Ass'y and the four shafts shown in the figure after components are replaced.

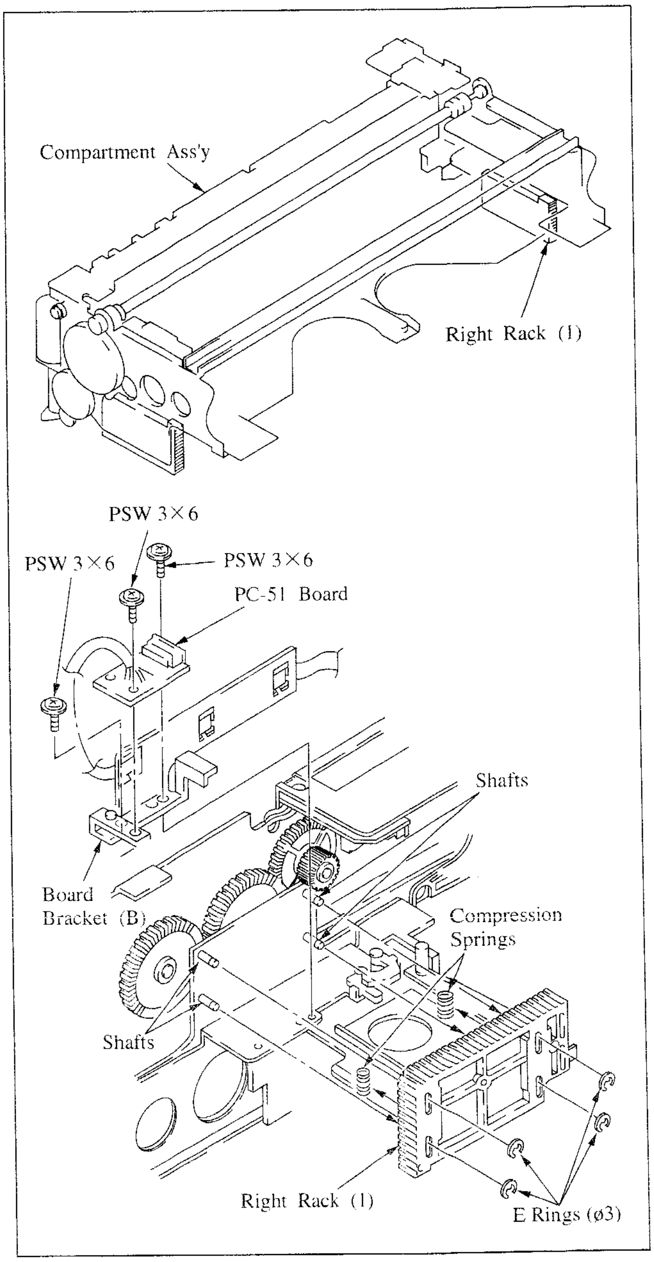

Compartment Ass'y
Right Rack (1)
PSW 3×6
PSW 3×6
PSW 3×6
PC-51 Board
Shafts
Board Bracket (B)
Compression Springs
Shafts
Right Rack (1)
E Rings (ø3)

Fig. 6-6-11 Right Rack (1) Removal

7. Stopper Shaft removal

(1) Remove four screws shown in Fig. 6-6-12, then remove the Holder Joint (B).
(2) Unhook three tension springs shown in Fig. 6-6-13 from the Compartment Ass'y.
(3) Remove E ring, move the Stopper Shaft in the direction indicated by arrow A, and extract the Stopper Shaft from the Compartment Ass'y. (Fig. 6-6-13 shows the left Stopper Shaft.)
(4) Remove the right Stopper Shaft in the same manner as the Left Stopper Shaft.

The components below can be replaced in this step.
- Holder Joint (B)
- Stopper Shafts

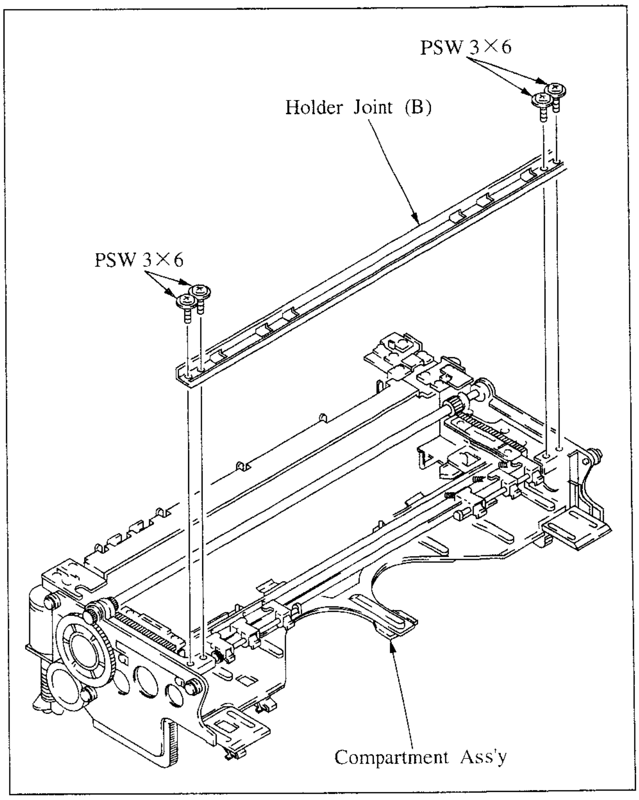

PSW 3×6
Holder Joint (B)
PSW 3×6
Compartment Ass'y

Fig. 6-6-12 Holder Joint (B) Removal

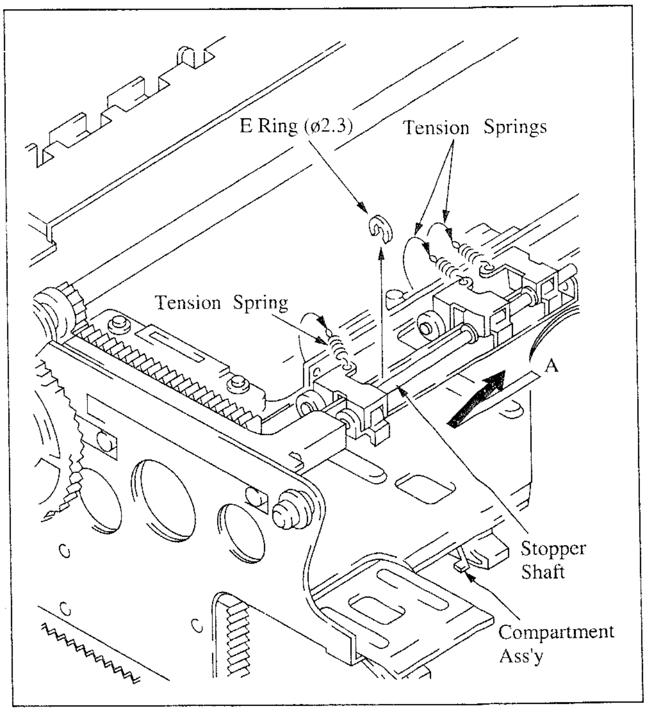

E Ring (ø2.3)
Tension Springs
Tension Spring
A
Stopper Shaft
Compartment Ass'y

Fig. 6-6-13 Stopper Shaft Removal

8. Drive Shaft (B) removal (Fig. 6-6-14)

   (1) Remove E ring and bearing (A) of the Holder Plate (R).
   (2) Remove two setscrews of the Holder Plate (L), then remove Gear ④ and bearing (B).
   (3) Move the Drive Shaft (B) in the direction indicated by arrow A and remove the Drive Shaft (B).

   The components below can be replaced in this step.
   - Drive Shaft (B)
   - Bearings (A) and (B)
   - Gear ④

Caution during assembling

- Smear Molyton grease slightly to each Gear Ass'y after components are replaced.
- Apply locking compound to the setscrews of the Gear ④ and tighten the setscrews.
- Rack (L)/(R) phase adjustment is required when the Drive Shaft (B) is installed. For the adjustment, refer to Section 6-6-3, "Adjustment during Cassette Compartment Component Replacement."

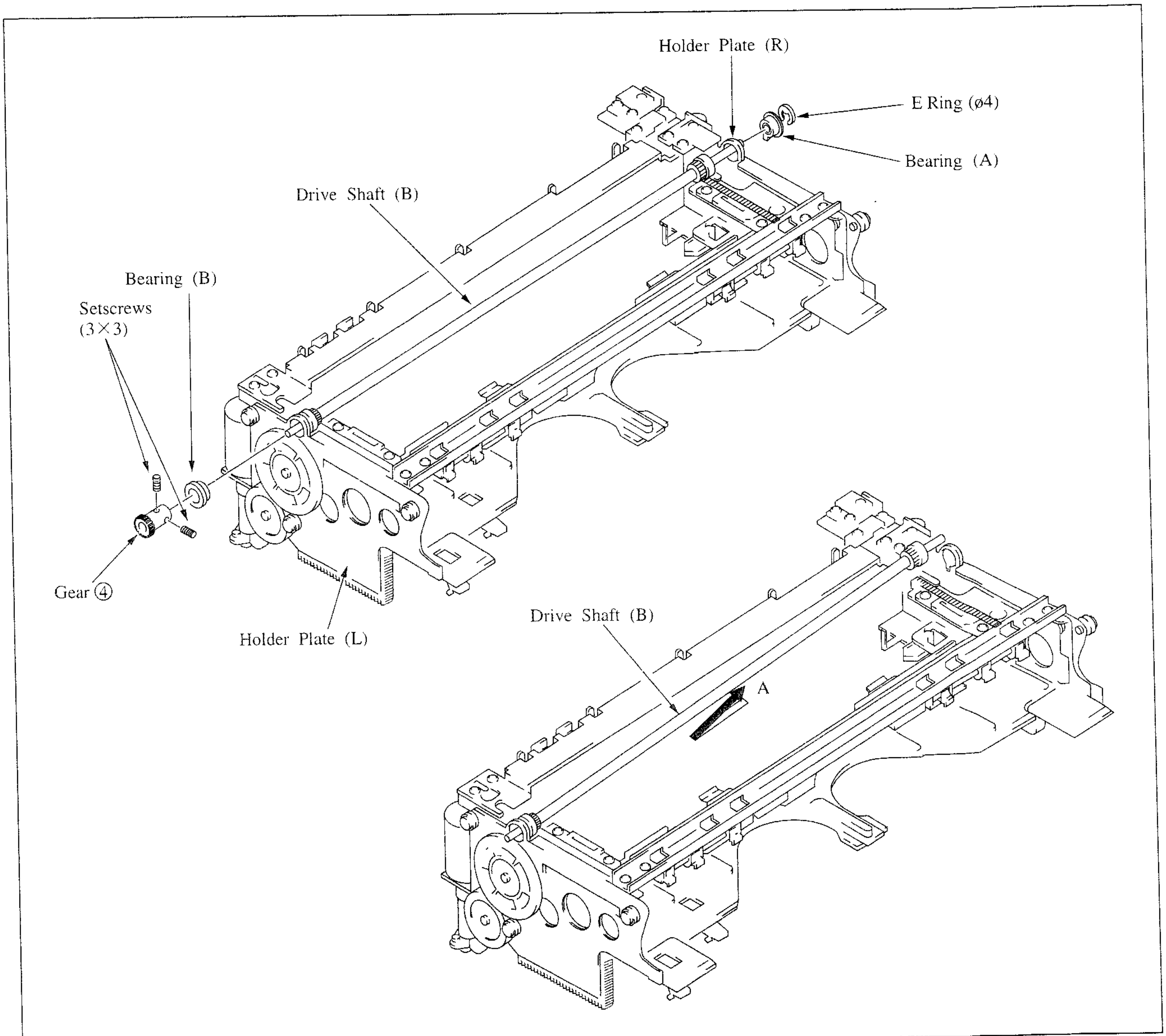

Holder Plate (R)
E Ring (ø4)
Bearing (A)
Drive Shaft (B)
Bearing (B)
Setscrews
(3×3)
Gear ④
Holder Plate (L)
Drive Shaft (B)
A

Fig. 6-6-14 Drive Shaft (B) Removal

9. Compartment (lower) Ass'y removal (Fig. 6-6-15)

(1) Bend six hooks of the Holder Joint (A) using pliers and remove the harness.
(2) Cut the harness clampe using a nipper.
(3) Remove two screws fixing the Holder Plate (L), then remove the Holder Plate (L) from the Holder Joint (A).
(4) Remove the Compartment (lower) Ass'y from the Holder Plate (R).

The component below can be replaced in this step.
- Compartment (lower) Ass'y

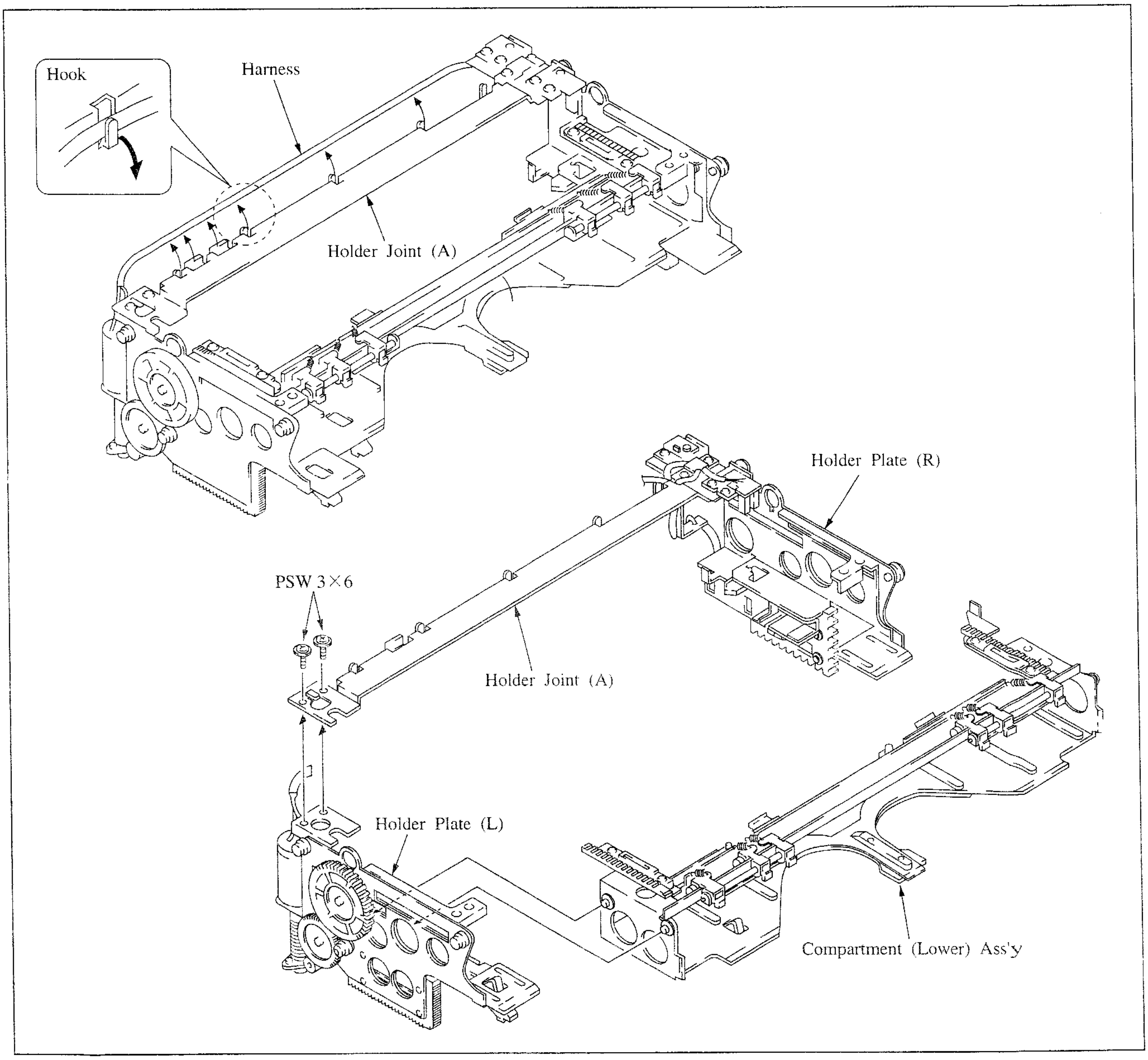
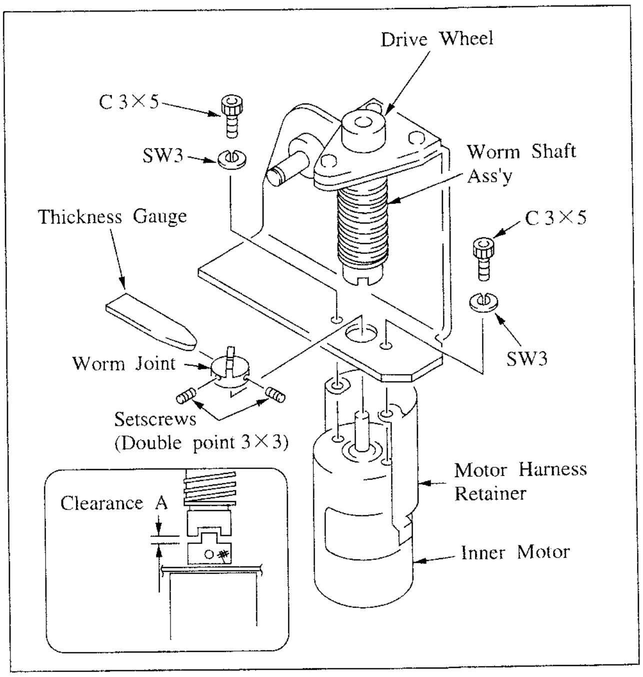

Hook
Harness
Holder Joint (A)
Holder Plate (R)
PSW 3×6
Holder Joint (A)
Holder Plate (L)
Compartment (Lower) Ass'y

Fig. 6-6-15 Compartment (Lower) Ass'y Removal

6-6-3. Adjustment during Cassette Compartment Component Replacement

1. Inner Worm Joint clearance adjustment (Fig. 6-6-16)

    (1) Put a thickness gauge (t0.4 mm) in clearance A between the Worm Shaft Ass'y and Worm Joint and tighten the two setscrews.
    (2) Extract the thickness gauge.
    (3) Turn the Drive Wheel of the Worm Shaft Ass'y with a finger and check that the Drive Wheel rotates smoothly.

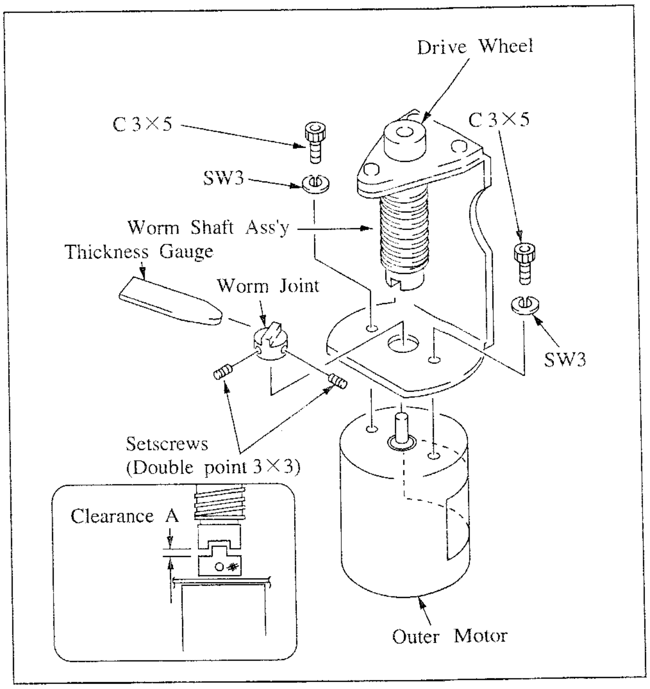


Drive Wheel
C 3×5
SW3
Worm Shaft Ass'y
Thickness Gauge
C 3×5
SW3
Worm Joint
Setscrews (Double point 3×3)
Clearance A
Motor Harness Retainer
Inner Motor

Fig. 6-6-16 Inner Worm Joint Clearance Adjustment

2. Outer Worm Joint clearance adjustment (Fig. 6-6-17)

    (1) Put a thickness gauge (t0.4 mm) in clearance A between the Worm Shaft Ass'y and Worm Joint and tighten the two setscrews.
    (2) Extract the thickness gauge.
    (3) Turn the Drive Wheel of the Worm Shaft Ass'y with a finger and check that the Drive Wheel rotates smoothly.



Drive Wheel
C 3×5
C 3×5
SW3
Worm Shaft Ass'y
Thickness Gauge
Worm Joint
SW3
Setscrews (Double point 3×3)
Clearance A
Outer Motor

Fig. 6-6-17 Outer Worm Joint Clearance Adjustment

3. Gears ① and ② clearance adjustment (Fig. 6-6-18)

(1) Set the Inner Motor Ass'y temporally to the Holder Plate (L) using two screws (PSW 3 × 6)
(2) Insert a wire gauge (0.2 mm dia.) into the engaging section of Gears ① and ② through a square hole on the Side Panel (L) until it strikes against the Motor Bracket.

Note: Insert the wire gauge into the space where the dent of the gear ② is nearest to the top of the gear ①.

(3) Tighten two screws (PSW 3 × 6) while pressing the Inner Motor Ass'y gently in the direction indicated by arrow A.
(4) Pull out the wire gauge and reinsert it in the same section. After that, check that the clearance between gears ① and ② meets the specifications below.

Specifications: • A wire gauge of 0.1 mm dia. passes through the clearance.
• A wire gauge of 0.3mm dia. does not pass through the clearance.

If the specifications are not met, readjust the clearance.

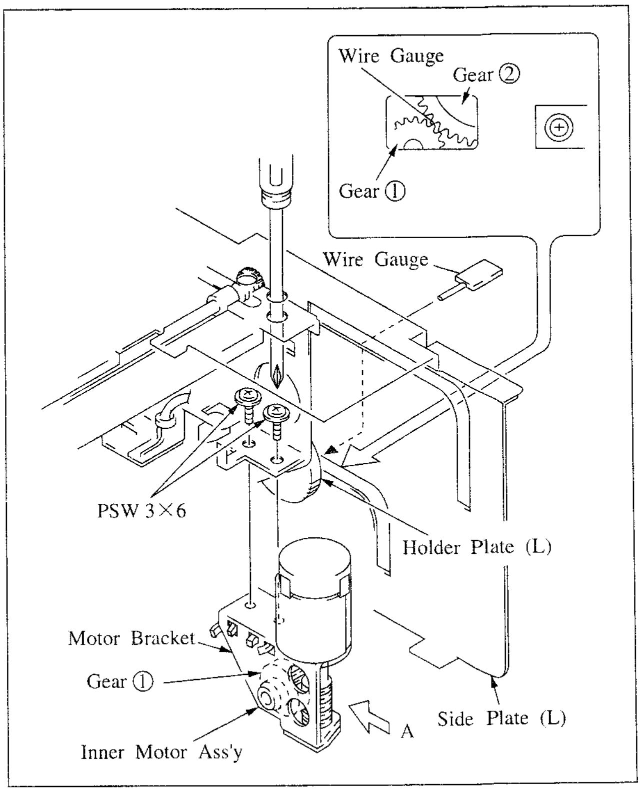

Wire Gauge
Gear ②
Gear ①
Wire Gauge
PSW 3×6
Holder Plate (L)
Motor Bracket
Gear ①
Inner Motor Ass'y
A
Side Plate (L)

Fig. 6-6-18 Gear (1) and Gear (2) Clearance Adjustment

4. Worm gear clearance adjustment (Fig. 6-6-19)

(1) Set the Outer Motor Ass'y temporally to the Holder Plate (L) using two screws (PSW 3 × 6).
(2) Insert a wire gauge (0.5 mm dia.) into the engaging section of the Worm Gear and Worm Wheel.

Note: Insert the wire gauge into the space where the dent of the Worm Wheel is nearest to the top of the Worm Gear.

(3) Tighten two screws (PSW 3 × 6) while pressing the Outer Motor Ass'y gently in the direction indicated by arrow A.
(4) Pull out the wire gauge and reinsert it in the same section. After that, check that the clearance between the Worm Gear and Worm Wheel meets the specifications below.

Specifications: • A wire gauge of 0.4 mm dia. passes through the clearance.
• A wire gauge of 0.6 mm dia. does not pass through the clearance.

If the specifications are not met, readjust the clearance.

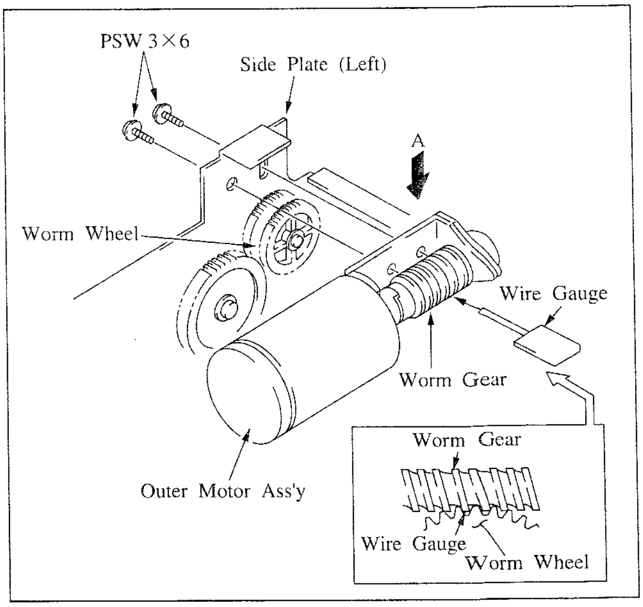

PSW 3×6
Side Plate (Left)
A
Worm Wheel
Wire Gauge
Worm Gear
Outer Motor Ass'y
Worm Gear
Wire Gauge
Worm Wheel

Fig. 6-6-19 Worm Gear Clearance Adjustment

5. Rack (L)/(R) phase adjustment (Fig. 6-6-20)

   (1) Pass the Drive Shaft (B) through the Holder Plates (L and R).
   (2) Adjust the position so that the Compartment (lower) ass'y is parallel to the Drive Shaft (B) when viewed from just above. (A and B are equal Fig. 6-6-20.)
   (3) Smear Molyton grease slightly to the inner circumference surface of bearings (A) and (B).
   (4) Install the bearings (A) and (B) and recheck that the Drive Shaft (B) is parallel to the Compartment (lower) ass'y.
   (5) Install the E ring in the Drive Shaft (B).
   (6) Install the gear (4) in the Drive Shaft (B), apply locking compound to the setscrews, and tighten the setscrews.
   (7) Move the Compartment (lower) Ass'y gently by hand and check that the Compartment Ass'y moves in parallel and smoothly.

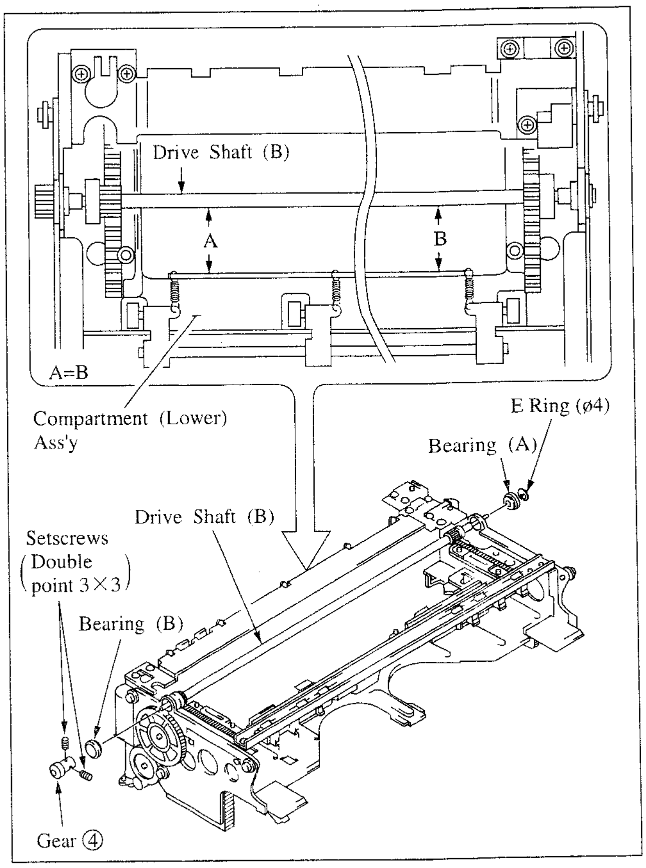

Drive Shaft (B)
A
B
A=B
Compartment (Lower) Ass'y
E Ring (ø4)
Bearing (A)
Drive Shaft (B)
Setscrews (Double point 3×3)
Bearing (B)
Gear ④

Fig. 6-6-20 Rack (L)/(R) Phase Adjustment

6. Sensor installation position adjustment (Fig. 6-6-21)

   (1) **Down-sensor**
   Install the Inner Down-sensor using the screws (PSW 3 x 6) so that the projection (A) of the Inner and Outer Ass'y is located in the longitudinal hole center of the Sensor Bracket.
   (2) **Outer Up-sensor/Mid-sensor/Down-sensor/Inner Up-sensor**
   Install the Outer Up-sensor, Mid-sensor, Down-sensor, and Inner Up-sensor using the screw (PSW 3×6) so that the projection (B) of the Sensor Bracket is located in the longitudinal hole center on the Side Panel (R).

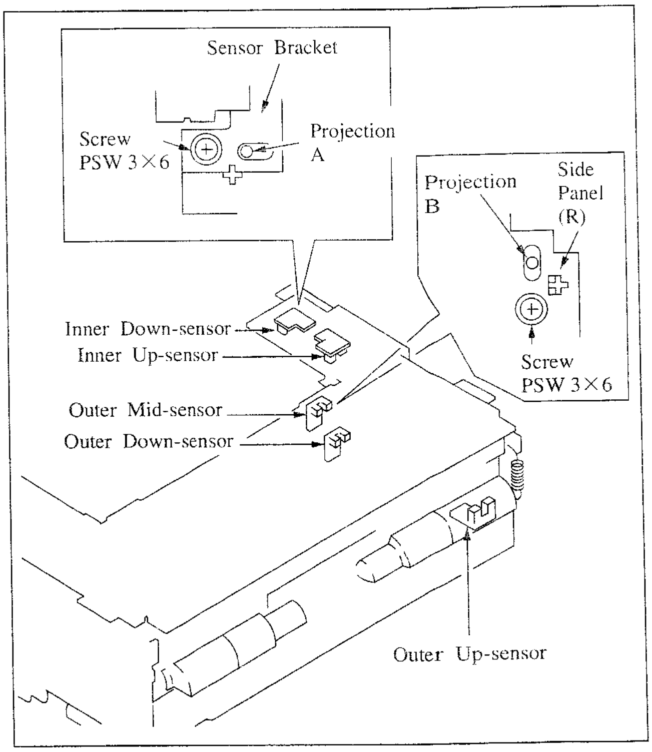

Sensor Bracket
Screw PSW 3×6
Projection A
Projection B
Side Panel (R)
Screw PSW 3×6
Inner Down-sensor
Inner Up-sensor
Outer Mid-sensor
Outer Down-sensor
Outer Up-sensor

Fig. 6-6-21 Sensor Installation Position Adjustment

6-7. REEL TABLE BLOCK COMPONENTS REPLACEMENT

Basic Knowledge

A. Replacement procedures of the components of the Reel Table Block are described as follows :

6-7-1. Reel Table Ass'y Replacement
6-7-2. Reel Brake Ass'y Replacement
6-7-3. Reel Motor Replacement
6-7-4. Timing Belt Replacement
6-7-5. Motor Frame Limiter Block Replacement
6-7-6. Motor Frame Ass'y Replacement

B. The Reel Table Block is composed of two assemblies. The one is the supply side (S side), and the other is the take-up side (T side). The replacement procedures of these assemblies are the same. This section describes the replacement procedures of the supply side.

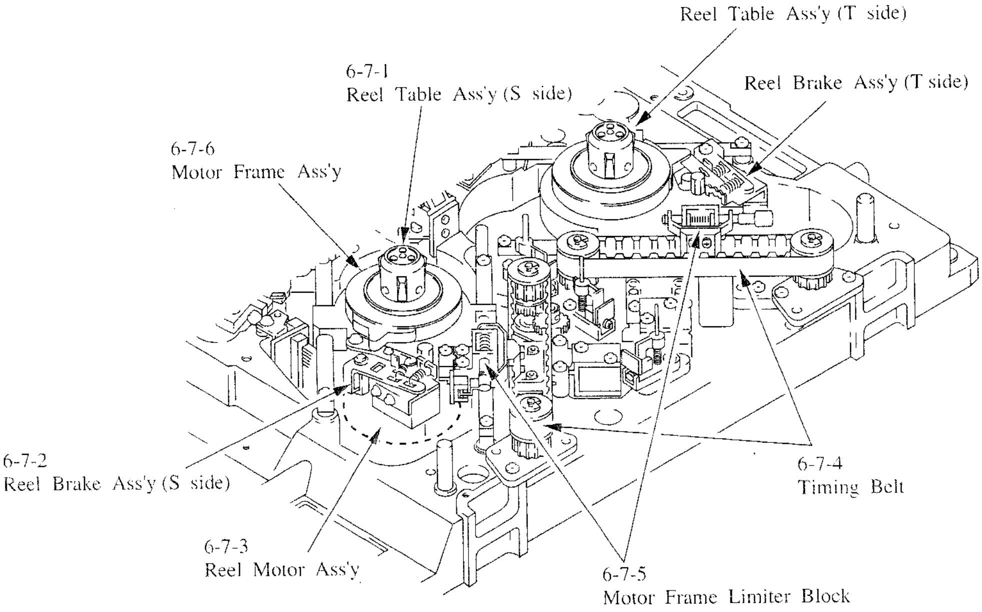

Reel Table Ass'y (T side)
6-7-1
Reel Table Ass'y (S side)
Reel Brake Ass'y (T side)
6-7-6
Motor Frame Ass'y
6-7-2
Reel Brake Ass'y (S side)
6-7-4
Timing Belt
6-7-3
Reel Motor Ass'y
6-7-5
Motor Frame Limiter Block

Fig.6-7-1 Reel Table Block Components

C. Test Menu setting procedures

[Test Menu setting procedures for the Reel Shift]

- Two types of setting methods are available for the Reel Shift Test Menu depending on the adjustment method:

(1) F21 mode
(2) F31 mode

In the F21 mode, automatic motor power on/off and variable power control are performed by using sensor information (such as potentiometer, panel sensor) as in normal operation.

In the F31 mode, sensor information is not used; there-fore, automatic motor power on/off and variable power control are not performed.

Replacement items that use the F21 mode:

- 6-7-1. Reel Table Ass'y Replacement
- 6-7-2. Reel Brake Ass'y Replacement
- 6-7-3. Reel Motor Replacement

Replacement items that use the F31 mode:

- 6-7-4. Timing Belt Replacement
- 6-7-5. Motor Frame Limiter Block Replacement
- 6-7-6. Motor Frame Ass'y Replacement

Note: Since sensor information is not used in the F31 mode, automatic motor power on/off and variable power control are not performed. Therefore, in this mode, operation continues while the cursor keys (< and > keys) are pressed.
Therefore, perform operations with extra care not to damage mechanical components such as limiter, stopper, or gears.

- Test Menu setting procedure for the Reel Shift in the F21 mode

Press the keys on the control panel in the following order.
[BKDV-101]
TEST , F6 (CHECKER),
Select the SP checker mode.
F1 (SP)
Set the Reel Shift test mode in the SP checker mode.
F6 (F), 2 , 1 , SET

[BKDV-200 series]
① SHIFT + SET UP
② ENTRY + center key + search dial (or ∨ key) to enter the <TEST> menu.
Turn the search dial clockwise or press ∨ key to select 807. [CHECKER MODE].
③ Press the > key to move the cursor to EXECUTE.
④ Press ∧ to enter the CHECKER mode.
⑤ Entry F28 by pressing the monitor select keys in the following sequence.
INPUT CHECK + 5 (F), 2, 8, SET
F can be inputted by selecting it the search dial and F1 (ALPH SET) key as well. (Refer to Section 6-(1)-4.)

- Test Menu setting procedure for the Reel Shift in the F31 mode

Press the keys on the control panel in the following order.
[BKDV-101]
[TEST] , [F6] (CHECKER),
Select the SP checker mode.
[F1] (SP)
Set the Reel Shift test mode in the SP checker mode.
[F6] (F), [3] , [1] , [SET]

[BKDV-200 series]
① [SHIFT] + [SET UP]
② [ENTRY] + center key + search dial (or [V] key) to enter the <TEST> menu.
Turn the search dial clockwise or the press [V] key to select 807. [CHECKER MODE].
③ Press the [>] key to move the cursor to EXECUTE.
④ Press the [Λ] key to enter CHECKER mode.
⑤ Entry F31 by pressing the monitor select keys in the following sequence.

[INPUT CHECK] + [5] (F), [3], [1], [SET]

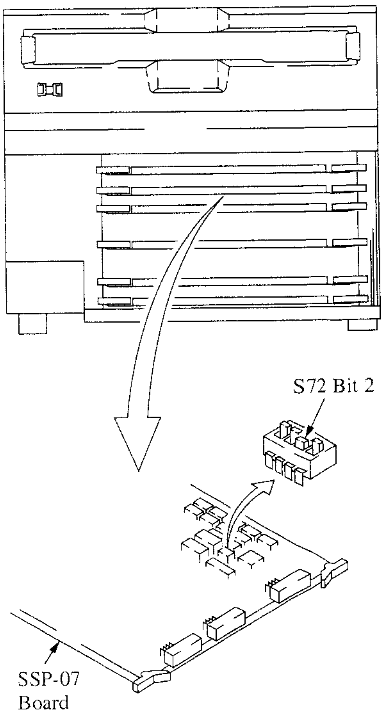
F can be inputted by selecting it the search dial and [F1] (ALPH SET) key as well. (Refer to Section 6-(1)-4.)

[Cursor key operation]

After performing the above settings, the reel position changes as follows according to the cursor key operations.
[<] or [>] : Reel position changes S to M, and L to M.
[<] + [ ] : Reel position changes S to L, and M to L.
[ ] + [>] : Reel position changes L to S, and M to S.

D. By performing the following work, each adjustment for the Reel Table Block can be performed when the Cassette Compartment Ass'y is not installed.

- Set S72 bit 2 of the SSP-07 Board to ON.



NOTE: After carring out the above step, the following WARNING MESSAGE is displayed on the Display.

[NO CASSETTE COMPARTMENT MODE]
S72-2 of SSP/SP board is switched ON

Turn S72 bit2 of switch to OFF after the adjustment, and the WARNING MESSAGE disappears on the Display.

This message is indicated on the display of the VTR that the ROM software versions on the SSP-07 Board are highet than 6.0 versions.

Note: After each adjustment is completed, be sure to set the bit to OFF. Otherwise, the machine will not operate normally.

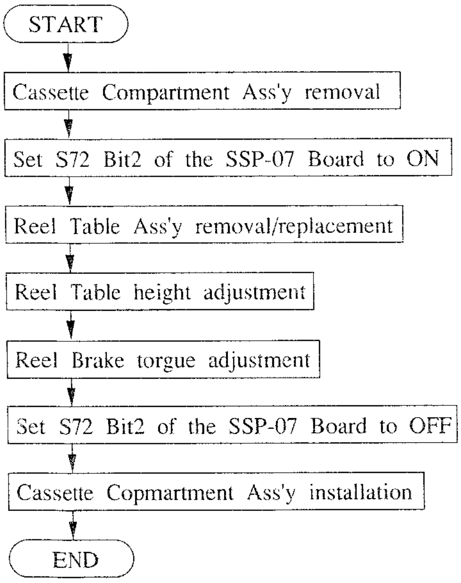
6-7-1. Reel Table Ass'y Replacement

Basic Knowledge

A. Prepare the following tools for adjustments.

- Hexagonal wrench
  Sony Parts No.: J-6153-970-A (across flats of 1.5 mm)
  7-700-766-03 (across flats of 2.0 mm)
  7-700-766-04 (across flats of 2.5 mm)
- L-shaped hexagonal wrench set
  Sony Parts No.: 7-700-736-00
  J-6041-700-C
- Reference Plate (28)
  Sony Parts No.: J-6257-390-A
- Reel Table Height Adjustment Tool
  Sony Parts No.: J-6252-190-B
- Cleaning liquid (or equivalent)
  Sony Parts No.: 9-919-573-00
- Thickness gauge
  Sony Parts No.: J-6041-670-A

B. Replacement flowchart


START
Cassette Compartment Ass'y removal
Set S72 Bit2 of the SSP-07 Board to ON
Reel Table Ass'y removal/replacement
Reel Table height adjustment
Reel Brake torgue adjustment
Set S72 Bit2 of the SSP-07 Board to OFF
Cassette Copmartment Ass'y installation
END

Removal

1. Cassette Compartment Ass'y removal
   Refer to Section 6-5.

2. Set Bit2 of S72 of the SSP-07 Board to ON
   Refer to Item D of Section 6-7, Basic Knowledge.

   Note: Be sure to set Bit2 of S72 of the SSP-07 Board to OFF after the adjustment.

3. Set the reel position to M, then turn off the power.
   [Reel position setting method]
   Refer to Item C of Section 6-7, Basic Knowledge.
   (F21 mode)

4. Reel Table Ass'y removal (Fig. 6-7-2)
   (1) Loosen the two fixing screws fastening the Reel Table Ass'y four to five turns.
   Use a hexagonal wrench (across flats of 2.0 mm).
   (2) Push the A portion of the Reel Brake Ass'y in the direction indicated by arrow B in the figure to release the Brake Shoe from the Reel Table. Then pull the Reel Table straight up from the unit.

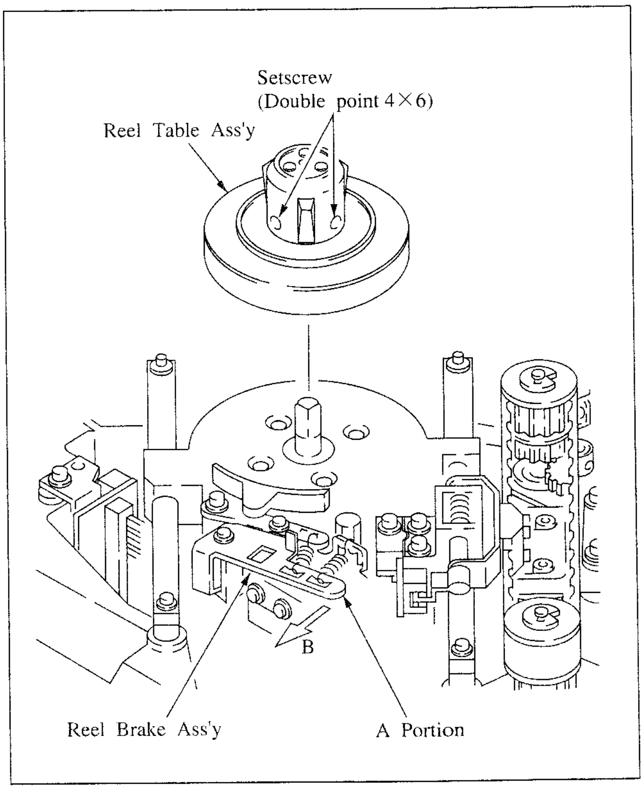

Setscrew
(Double point 4×6)
Reel Table Ass'y
B
Reel Brake Ass'y
A Portion

Fig. 6-7-2 Reel Table Ass'y Removal

Replacement/Installation

5. Reel Table Ass'y removal
   (1) Clean the mounting surface (Fig. 6-7-3)
   - Clean the Reel Motor Shaft and the shaft hole of mounting surface for the Reel Table Ass'y.

   Note: When cleaning, make sure that the two tops of the reel table setscrews do not project into the inner surface of the hole.
   When they projected, loosen them with a hexagonal wrench.

   (2) Match the flat surface (D cut) portions of the Reel Motor Shaft to the setscrew holes of the Reel Table Ass'y, and install the Reel Table Ass'y onto the Reel Motor Shaft.
   (3) Tighten the two screws temporarily.

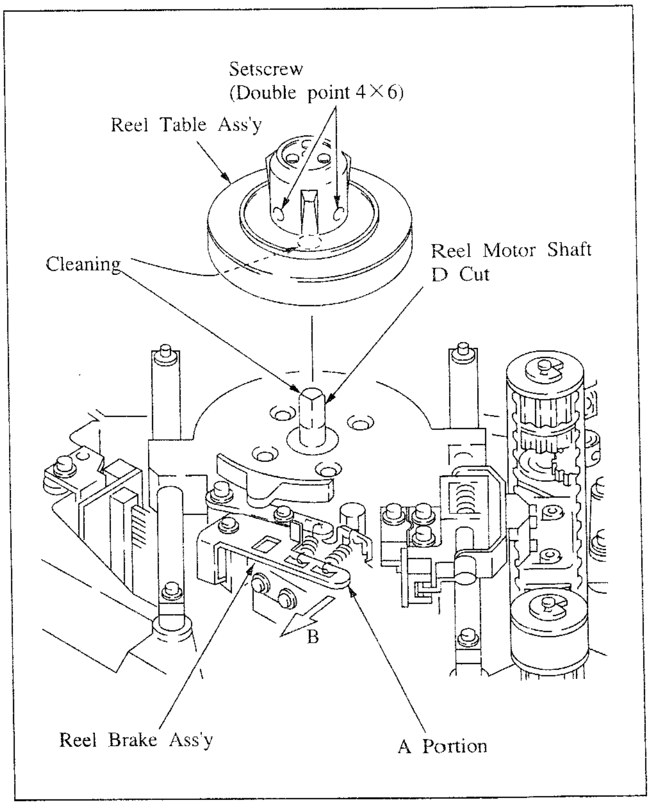

Setscrew
(Double point 4×6)
Reel Table Ass'y
Cleaning
Reel Motor Shaft
D Cut
B
Reel Brake Ass'y
A Portion

Fig. 6-7-3 Reel Table Ass'y Installation

6. Reel Table height adjustment (Fig. 6-7-4)

(1) Clean the mounting surfaces of the Reference Plate Tool and Base Plate, and the adjusting surface of the Reel Table Height Adjustment Tool with a cleaning piece moistened with cleaning liquid.

(2) Install the tools as shown in Fig. 6-7-4.

(3) Loosen the two setscrews half to one turn from the temporarily tightened position.

(4) Using a finger, rotate the Reel Table one full turn in the clockwise direction.
While rotating the Reel Table, check that the positional relationship between the Reel Sheet on the Reel Table and the D/E portions of the reel table height adjustment tool meets the following specifications. If the specifications are not met, adjust the height of the Reel Table with the reel table height adjustment screw.
Use a hexagonal wrench (across flats of 1.5 mm).

Note: Adjust the height of the Reel Table on Take-up side by inserting a 0.09 mm thickness gauge between the Reference Plate and the Reel Table Height Adjustment Tool.

Specifications
(In whichever position, when turn the Reel Table with the finger.)

D portion: The Reel Table Height Adjustment Tool must not be in contact with the Reel Sheet surface.

E portion: The Reel Table Height Adjustment Tool must be in contact with the Reel Sheet surface.
(At this time, make sure that the Reel Table Height Adjustment Tool is not lifting up from the Reference Plate.)

(5) If the adjustment has met the specifications, tighten the two setscrews.
Tightening torque : 117.6×10^{-2} N·m (12 kgf·cm)

(6) Perform step (4) again, and check that the specifications are met.

(7) Remove the tools from the unit.

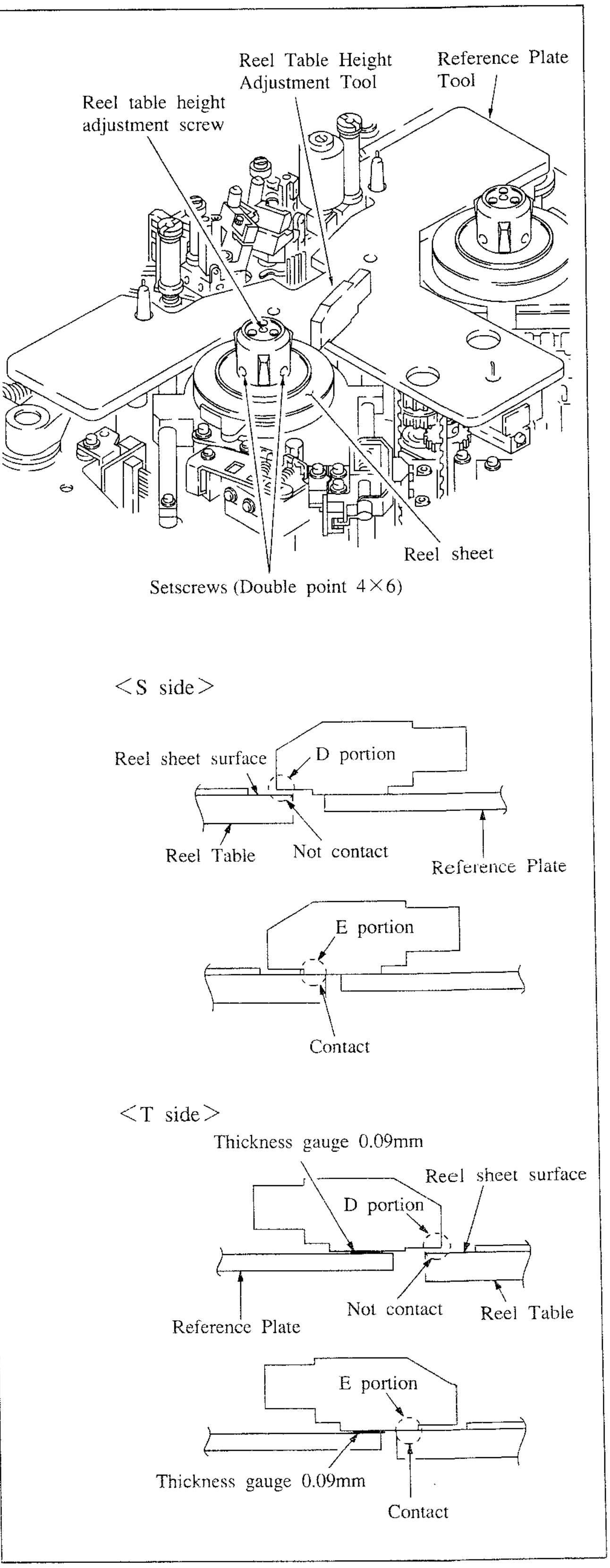

Reel Table Height Adjustment Tool
Reference Plate Tool
Reel table height adjustment screw
Reel sheet
Setscrews (Double point 4×6)
<S side>
Reel sheet surface
D portion
Reel Table
Not contact
Reference Plate
E portion
Contact
<T side>
Thickness gauge 0.09mm
Reel sheet surface
D portion
Not contact
Reel Table
Reference Plate
E portion
Thickness gauge 0.09mm
Contact

Fig. 6-7-4 Reel Table Height Adjustment

7. Reel Brake torque adjustment
   (1) Turn on the power.
   (2) Press the keys on the control panel in the following order, and select the Reel Brake Test Menu of SV mode.

[BKDV-101]
[TEST], [F6] (CHECKER),
Select the SV checker mode.
[F2] (SV)
In the SV checker mode, Entry D1F (for Supply side) or D1E (for Take-up side). Then, press [>] key to set the Brake Torque Check Menu. Automatic check is performed with this setting.

Note: Perform brake torque measurement two times for both the Supply and Take-up sides, and check the second brake torque values.

Supply side : [F4] (D), [1], [F6] (F), [SET], [>]
Take-up side : [F4] (D), [1], [F5] (E), [SET], [>]

[BKDV-200 series]
① [SHIFT] + [SET UP]
② [ENTRY] + center key +search dial (or [V] key) to enter the <TEST> menu.
Turn the search dial clockwise or press [V] key to select 807. [CHECKER MODE.]
③ Press the [>] key to move the cursor to EXECUTE.
④ Press the [Λ] key to enter CHECKER mode.
⑤ Press the [SHIFT], [F3] (BOARD) to set the SV mode.
⑥ Press the following keys to set the Brake Torque Check Menu. Automatic adjustment is performed with this setting.

Note: Perform brake torque measurement two times for both the Supply and Take-up sides, and check the second brake torque values.

Supply side: Entry D1F by pressing the monitor select keys, and press [>] key.

[INPUT CHECK] + [3] (D), [1],
[INPUT CHECK] + [5] (F), [SET], [>]

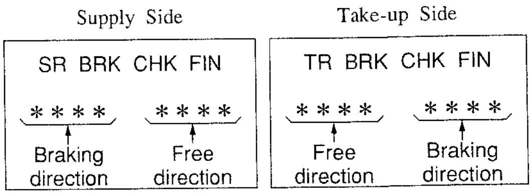
D and F can be imputted by selecting it the search dial and [F1] (ALPH SET) key as well (Refer to Section 6-(1)-4.)

Take-up side: Entry D1E by pressing the monitor select keys, and press [>] key.

[INPUT CHECK] + [3] (D), [1],
[INPUT CHECK] + [4] (E), [SET], [>]

D and E can be imputted by selecting it the search dial and [F1] (ALPH SET) key as well (Refer to Section 6-(1)-4.)

(3) When setting the above, make sure that the brake torque value (HEX) displayed on the control panel meets the following specifications:



Specifications :
When turning the Reel Table in the free direction: 0080 to 0170
When turning the Reel Table in the braking direction: 0550 to 1000

If these specifications are satisfied, perform step (6) and the subsequent steps.
If not, perform step (4) and the sudsequent steps.

(4) Change the hook position of the tension springs a and b as shown in Fig. 6-7-5 to meet the specifications.

Note: When changing the tension springs, never extend them.

Free direction	Brake torque	Braking direction
d-a	Getting down	1-4
-b	↑	-5
-c		-6
e-a		2-4
-b	Initial setting position	-5
-c		-6
f-c		3-6
-b	↓	-5
-a	Getting up	-4

(5) After replacing the springs, adjust the brake torque once again. Make sure that the specifications in step(3) are fulfilled. If the specifications are not met, repeat steps(4).

(6) Turn off the power.

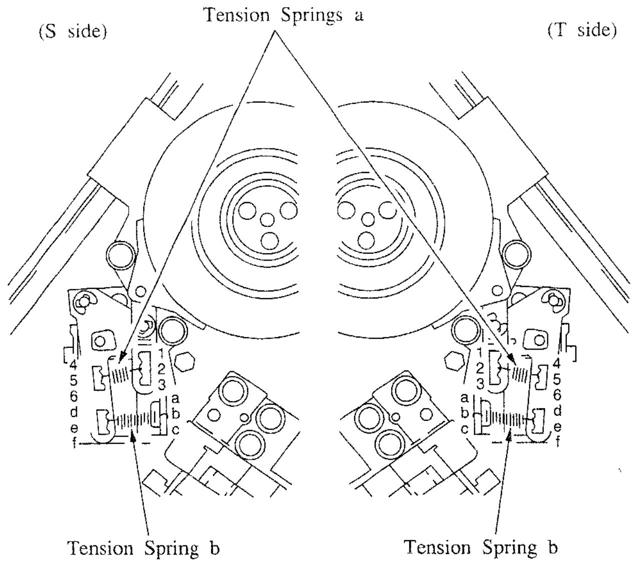

(S side)
Tension Springs a
(T side)
1
2
3
4
5
6
a
b
c
d
e
f
Tension Spring b
Tension Spring b

Fig. 6-7-6 Reel Brake Torgue Adjustment

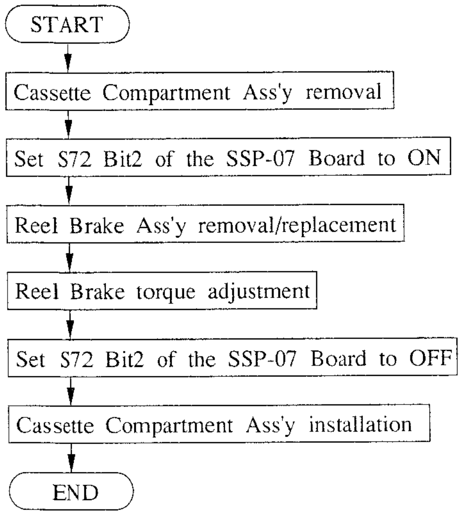
8. Set Bit2 of S72 of the SSP-07 Board to OFF.

9. Cassette Compartment Ass'y installation
   Refer to Section 6-5.

6-7-2. Reel Brake Ass'y Replacement

Basic Knowledge

A. Replacement flowchart


START
Cassette Compartment Ass'y removal
Set S72 Bit2 of the SSP-07 Board to ON
Reel Brake Ass'y removal/replacement
Reel Brake torque adjustment
Set S72 Bit2 of the SSP-07 Board to OFF
Cassette Compartment Ass'y installation
END

Removal

1. Cassette Compartment Ass'y removal
   Refer to Section 6-5.

2. Set Bit2 of S72 of the SSP-07 Board to ON.
   Refer to Item D of Section 6-7, Basic Knowledge.

   Note: Set Bit2 of S72 of the SSP-07 Board to OFF after the adjustment.

3. Set the reel position to M or S, and turn off the power.

   [Reel Position Setting Method]
   Refer to Item C of Section 6-7, Basic Knowledge (F21 mode).

4. Reel Brake Ass'y removal (Fig. 6-7-6)
   - Remove the two screws fixing the Reel Brake Ass'y, and remove the Reel Brake Ass'y.
   - After removing the Reel Brake Ass'y from the Reel Motor Frame, disconnect the solenoid harness.

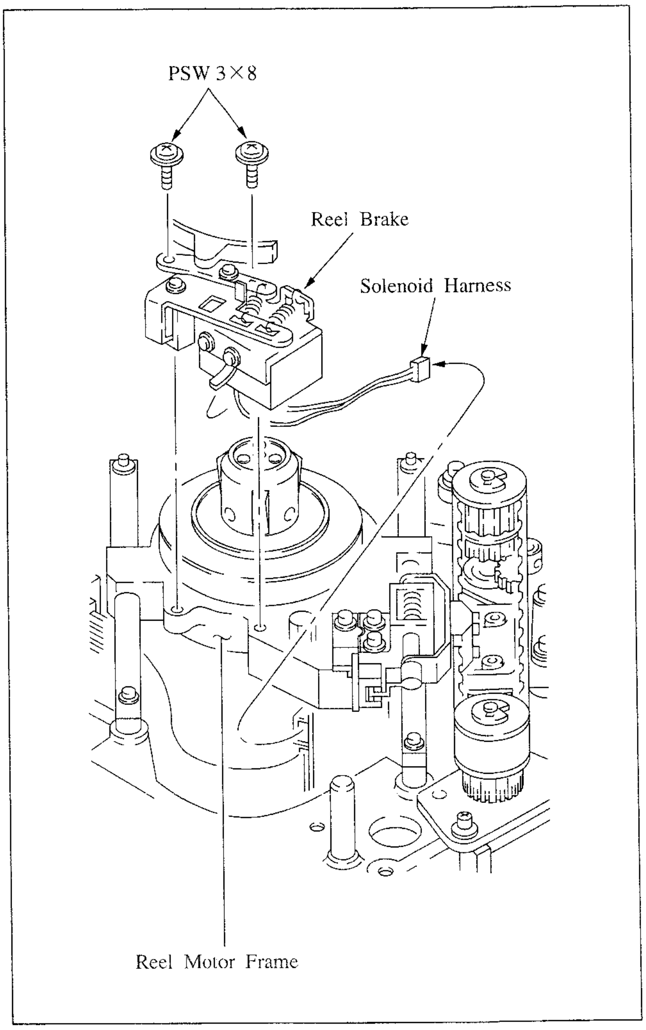

PSW 3×8
Reel Brake
Solenoid Harness
Reel Motor Frame

Fig. 6-7-6 Reel Brake Ass'y Replacement

Replacement/Installation

5. Component replacement
   (Fig. 6-7-7)
   - Replace and assemble the Reel Brake Ass'y components as shown in the figure.

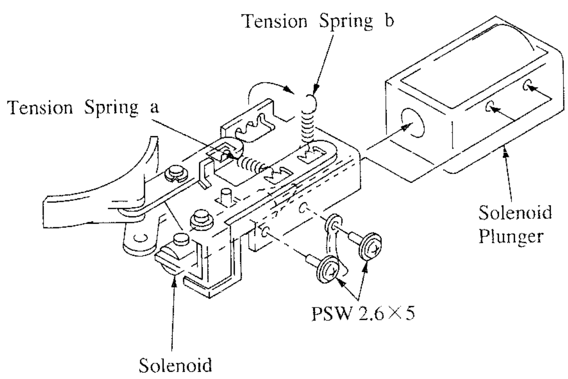
   [Notes on replacing or installing the tension spring]
   When the damage on the tension spring is detected, replace it with a new one.
   After removing or replacing the tension spring, hook the new spring on the position shown in detailed figure (A).

6. Reel Brake Ass'y installation
   - Install the Reel Brake Ass'y in the reverse order of step 4.

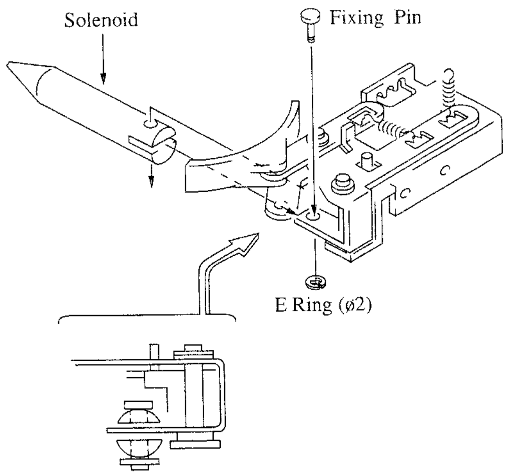
Procedures for disassembling/assembling Reel Brake Ass'y

- Disassembling procedure: Disassemble in the order from step 1 to step 3.
- Assembling procedure: Assemble in the reverse order of the disassembling procedure.

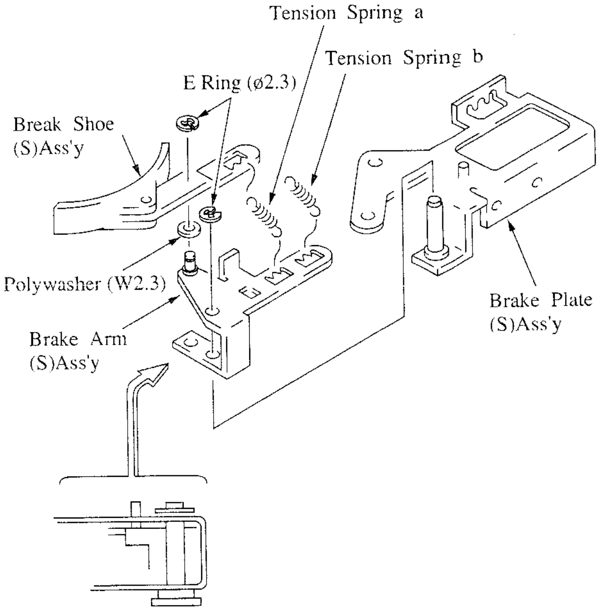
1. Solenoid Plunger Removal (1)


Tension Spring b
Tension Spring a
Solenoid Plunger
PSW 2.6×5
Solenoid

2. Solenoid Plunger Removal (2)


Solenoid
Fixing Pin
E Ring (ø2)

3. Brake Shoe (S)Ass'y Removal


Tension Spring a
Tension Spring b
E Ring (ø2.3)
Break Shoe (S)Ass'y
Polywasher (W2.3)
Brake Arm (S)Ass'y
Brake Plate (S)Ass'y

Detailed figure (A)

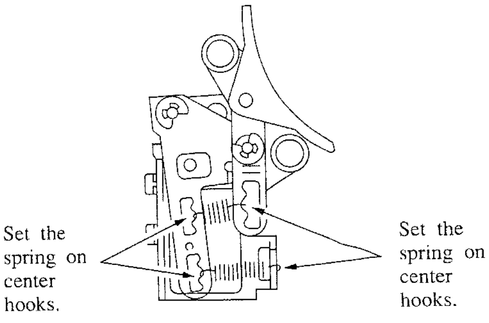

Set the spring on center hooks.
Set the spring on center hooks.

Fig. 6-7-7 Reel Brake Ass'y Component Replacement

Adjustment

7. Reel Brake torque adjustment
   Refer to Section 6-7-1, step 7.

8. Set Bit2 of S72 of the SSP-07 Board to OFF.

9. Cassette Compartment Ass'y installation
   Refer to Section 6-5.

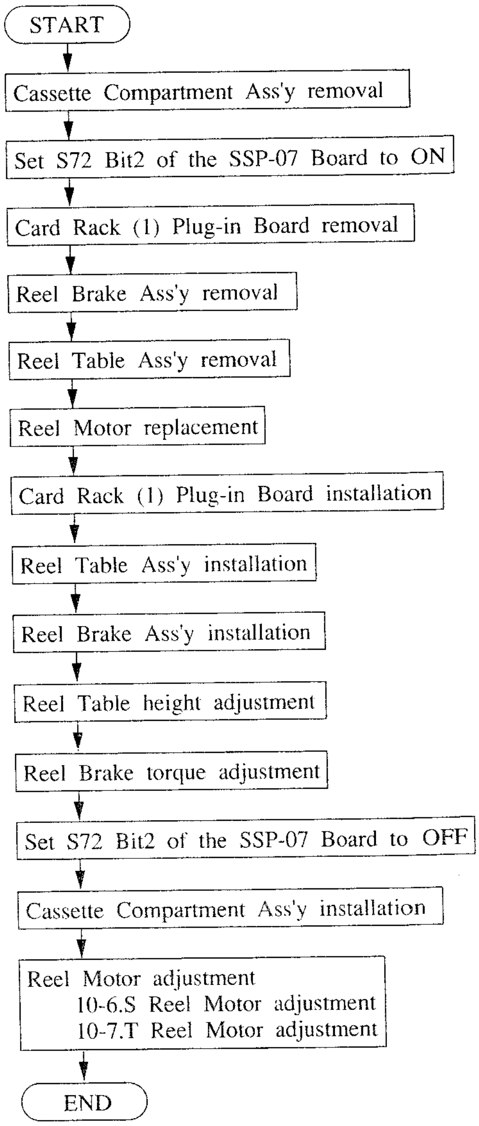
6-7-3. Reel Motor Replacement

Basic Knowledge

A. Prepare the following tools for adjustment after replacement.

- Hexagonal wrench
  Sony Parts No.: J-6153-970-A (across flats of 1.5 mm)
  7-700-766-03 (across flats of 2.0 mm)
  7-700-766-04 (across flats of 2.5 mm)
- Reference Plate (28)
  Sony Parts No.: J-6257-390-A
- Reel Table Height Adjustment Tool
  Sony Parts No.: J-6252-190-B
- Cleaning liquid (or the equivalent)
  Sony Parts No.: 9-919-573-00

B. Replacement flowchart


START
Cassette Compartment Ass'y removal
Set S72 Bit2 of the SSP-07 Board to ON
Card Rack (1) Plug-in Board removal
Reel Brake Ass'y removal
Reel Table Ass'y removal
Reel Motor replacement
Card Rack (1) Plug-in Board installation
Reel Table Ass'y installation
Reel Brake Ass'y installation
Reel Table height adjustment
Reel Brake torque adjustment
Set S72 Bit2 of the SSP-07 Board to OFF
Cassette Compartment Ass'y installation
Reel Motor adjustment
10-6.S Reel Motor adjustment
10-7.T Reel Motor adjustment
END

Removal

1. Cassette Compartment Ass'y removal
   Refer to Section 6-5.

2. Set Bit2 of S72 of the SSP-07 Board to ON.
   Refer to Item D of Section 6-7, Basic Knowledge.

   Note: Set Bit2 of S72 of the SSP-07 Board to OFF after the adjustment.

3. Set the reel position to M, and then turn off the power.
   [Reel position setting method]
   Refer to Item C of Section 6-7, Basic Knowledge.
   (F.2.1 mode)

4. Card Rack (1) Plug-in Board removal (Fig. 6-7-8)
   Disconnect the six Plug-in Boards of the Card Rack (1).
   [Plug-in board disconnection/insertion method]
   Refer to Section 2-4.

   Card Rack (1):
   - MD-62 Board
   - SSP-07 Board
   - PR-157 Board
   - DE-37 Board
   - EN-99 Board
   - AD-73 Board (DVR-28 only)
   - AD-90 Board (DVR-P28 only)

5. Reel Brake Ass'y removal
   Refer to Section 6-7-2, step 4.

6. Reel Table Ass'y removal
   Refer to Section 6-7-1, step 3.

7. Disconnect the Flexible Card Wire from the Motor Board (Fig. 6-7-9).
   [Flexible card wire disconnection/insertion method]
   Refer to Section 2-5-4.

   Note: Handle the Flexible Card Wire with extra care because bending the wire can shorten its service life extremely.

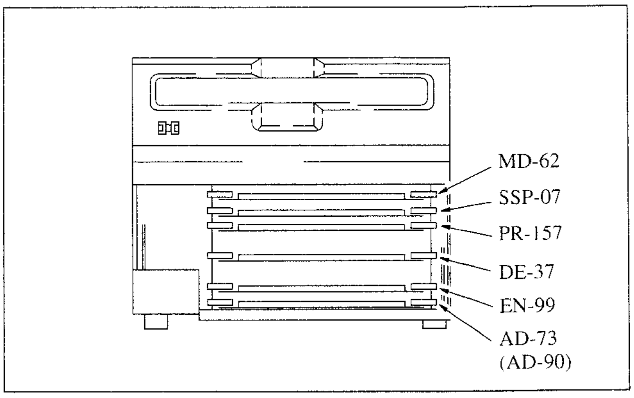


Fig. 6-7-8 Card Rack (1) Plug-in Boards Disconnection

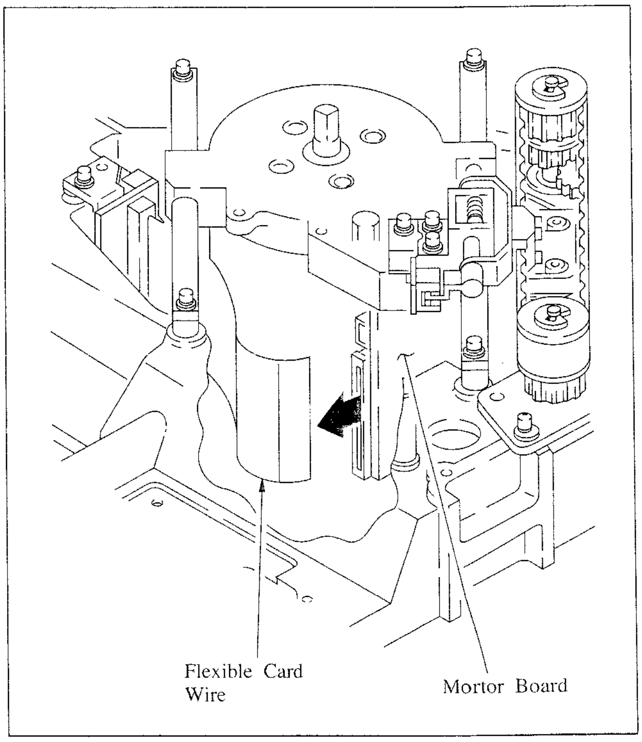


Fig. 6-7-9 Flexible Card Wire Disconnection

8. Reel Motor removal (Fig. 6-7-10)
   - While holding the bottom of the Reel Motor, remove the four screws fastening the Reel Motor. Then remove the Reel Motor from the lower side of the Base Plate.

Note: There may be a spacer inserted (at the side of any hole out of the four holes) between the Reel Motor and Motor Frame. When removing the Reel Motor, take care not to allow the spacer to fall. When replacing the Reel Motor, the spacer should be reinserted in the same place.

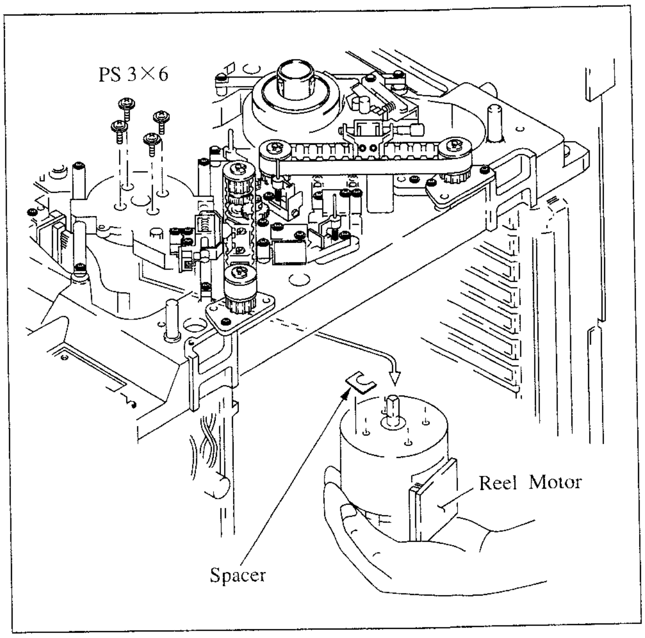


Fig. 6-7-10 Reel Motor Replacement

Replacement/Installation

9. Clean the mounting surfaces.
   - Clean the mounting surfaces of the new Reel Motor and Motor Frame with a cleaning piece moistened with cleaning liquid.

10. Reel Motor installation
    - Install the Reel Motor onto the Motor Frame in the reverse order of Step 8.

[Note on replacing the Supply-side Reel Motor]
Install the Supply-side Reel Motor while turning the Reel Motor in the clockwise direction as shown in Fig. 6-7-11.

[Note on replacing the Take-up-side Reel Motor]
Install the Take-up-side Reel Motor while turning the Reel Motor in the counterclockwise direction as shown in Fig. 6-7-11.

※ While turning the T Reel Motor in the clockwise direction (S Reel Motor in the counterclockwise direction) and tighten four screws.

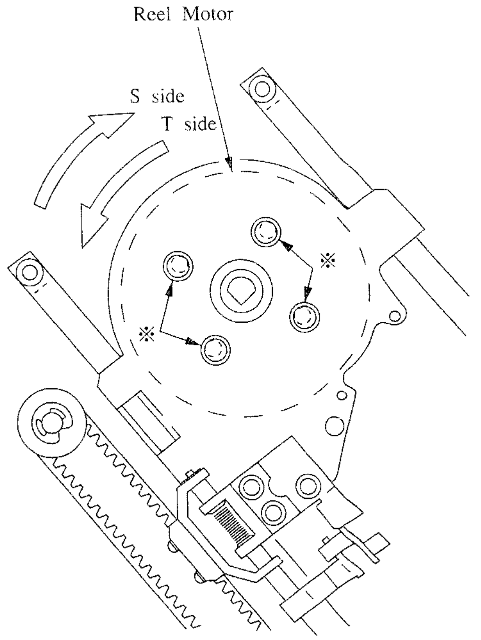


Fig. 6-7-11 Reel Motor Installation

11. Reassemble the following parts in the reverse order of steps 4 to 7.
    - Flexible Card Wire
    - Reel Table Ass'y
      (Tighten two screws fixing the Reel Table Ass'y temporarily.)
    - Reel Brake Ass'y
    - Card Rack (1) Plug-in Board

12. Reel Table height adjustment
    Refer to Section 6-7-1, step 6.

13. Reel Brake torque adjustment
    Refer to Section 6-7-1, step 7

14. Set Bit2 of S72 of the SSP-07 Board to OFF.

15. Cassette Compartment Ass'y installation
    Refer to Section 6-5.

16. Reel Motor adjustments
    Supply side : Refer to Section10-6.
    Take-up side : Refer to Section10-7.

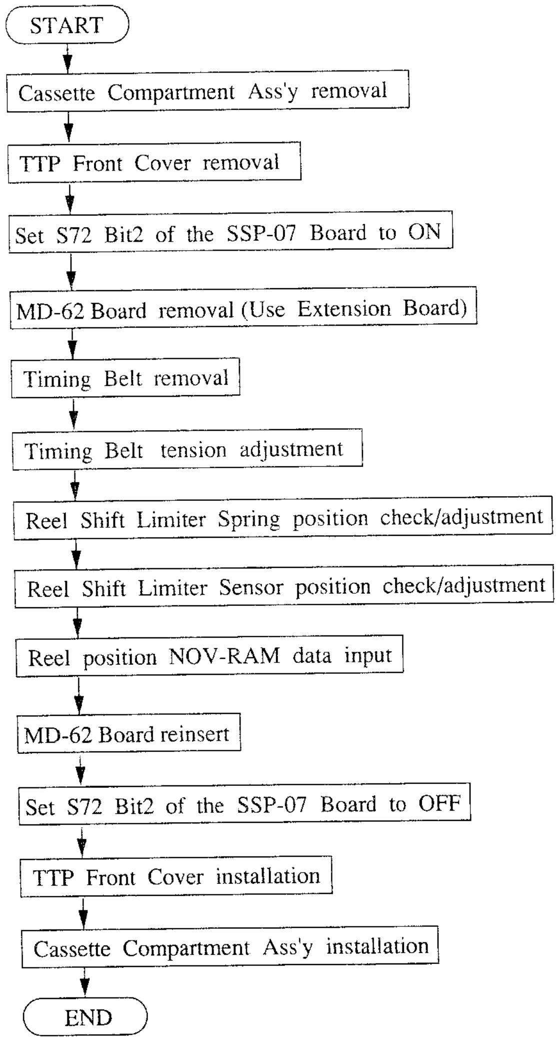
6-7-4. Timing Belt Replacement

Basic Knowledge

A. Prepare the following tools for adjustments.

- EX-185 Board (attachment DVR-28)
  Sony Parts No.: A-6001-015-A
- Tension Scale 5 kg
  Sony Parts No.: J-6041-640-A
- Thickness gauge
  Sony Parts No.: J-6041-670-A
- Cleaning piece
  Sony Parts No.: 2-034-697-00
- Locking compound (Screw Lock)
- Tension Measuring Tool
  (String or wire rope that is fit for 6 kg forces.)
- L/M/S cassette tape (for general use)
- Cleaning liquid (or equivalent)
  Sony Parts No.: 9-919-573-00

B. Replacement flowchart


START
Cassette Compartment Ass'y removal
TTP Front Cover removal
Set S72 Bit2 of the SSP-07 Board to ON
MD-62 Board removal (Use Extension Board)
Timing Belt removal
Timing Belt tension adjustment
Reel Shift Limiter Spring position check/adjustment
Reel Shift Limiter Sensor position check/adjustment
Reel position NOV-RAM data input
MD-62 Board reinsert
Set S72 Bit2 of the SSP-07 Board to OFF
TTP Front Cover installation
Cassette Compartment Ass'y installation
END

Removal

1. Cassette Compartment Ass'y removal
   Refer to Section 6-5.

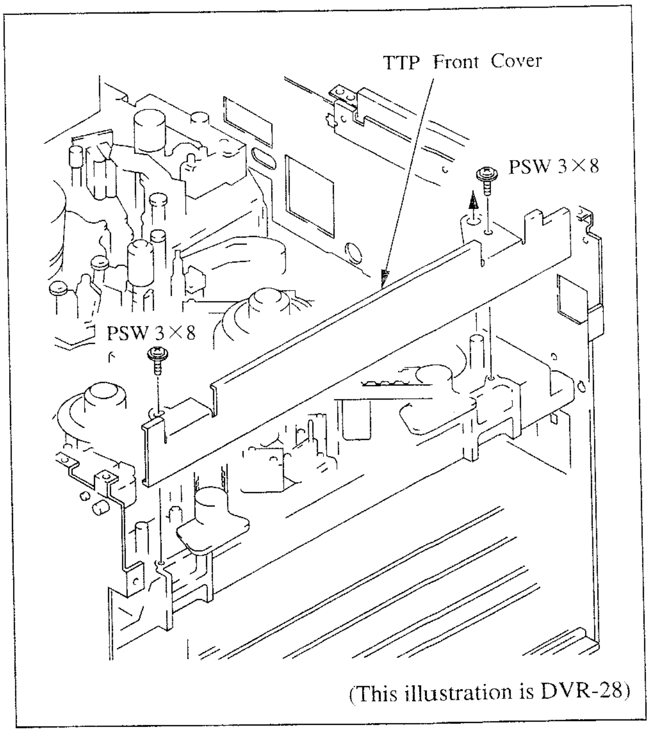
2. TTP Front Cover removal (Fig. 6-7-12)
   - Remove the two screws fastening the TTP Front Cover, then remove the TTP Front Cover.

3 Set Bit2 of S72 of the SSP-07 board to ON.
Refer to Item D of Section 6-7, Basic Knowledge.

Note: Be sure to set Bit2 of S72 of the SSP-07 Board to OFF after the adjustment.

4. Remove the MD-62 Board (Plug-in Board) of the Card Rack (1), and extend it with the EX-138 Extension Board. Reinsert it to the unit.
   [Extension Board use method]
   Refer to Section 1-6.

5. Set the reel position to L, and next set it to M, and then turn off the power.
   [Reel position setting method]
   Refer to Item C of Section 6-7, Basic Knowledge.
   (F31 mode)


TTP Front Cover
PSW 3×8
PSW 3×8

(This illustration is DVR-28)

Fig. 6-7-12 TTP Front Cover Removal

6. Timing Belt removal (Fig. 6-7-13)
    1. (1) Remove the two screws fixing the Sub Pulley Ass'y, then remove the Sub Pulley Ass'y.
    2. (2) Remove the Timing Belt from the Pulley Ass'y.
    3. (3) Remove the four screws fixing the Belt Holder (B), and remove the Belt Holder (B) and Timing Belt from the Belt Holder (A).

Replacement/Installation

7. Timing Belt installation
    1. (1) Clean the mounting surfaces of the Timing Belt, Belt Holder (A), Belt Holder (B), Pulley Ass'y and Sub Pulley Ass'y with a cleaning piece moistened with cleaning liquid.
    2. (2) Assemble the Timing Belt with the Belt Holder (B) as shown in the Fig. 6-7-13, Fig. 1, and install these assembled parts to the Belt Holder (A) with four screws.
    3. (3) Push the Motor Frame in the direction indicated by arrow A with the finger, and knock the Stopper Catcher against the M Stopper Shaft. Hook the Timing Belt on the pulleys of the Pulley Ass'y and Sub Pulley Ass'y. (Fig. 6-7-14)

       Note: Be sure that the Timing Belt is not slack when it is hooked onto the pulleys.

    4. (4) Install the Sub Pulley Ass'y temporarily using two screws.

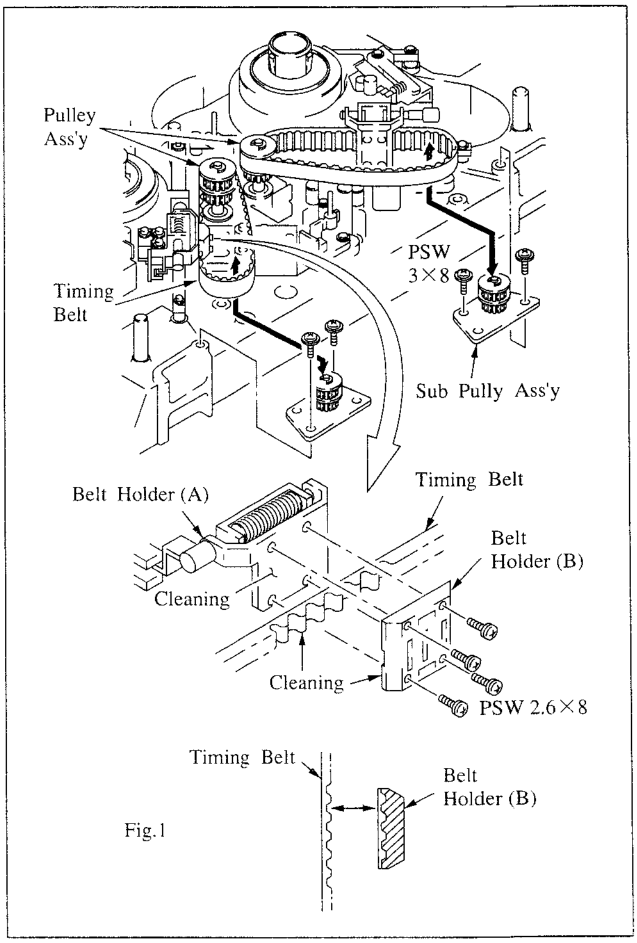
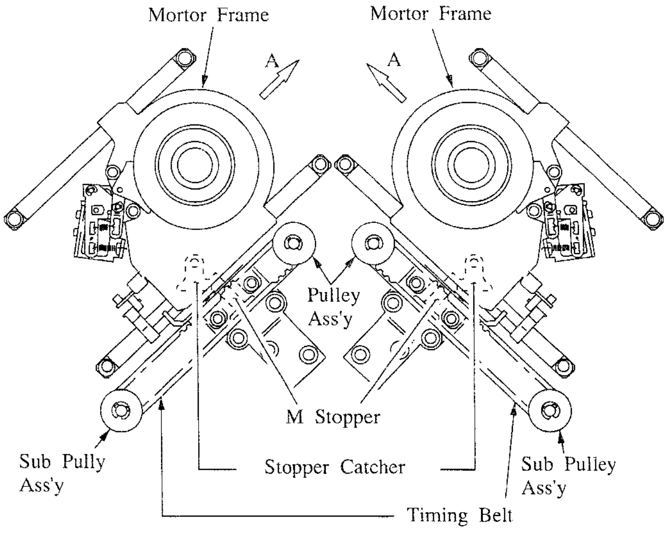

Pulley Ass'y
Timing Belt
PSW 3×8
Sub Pully Ass'y
Belt Holder (A)
Timing Belt
Belt Holder (B)
Cleaning
Cleaning
PSW 2.6×8
Timing Belt
Belt Holder (B)
Fig. 1

Fig. 6-7-13 Timing Belt Replacement (1)


Mortor Frame
Mortor Frame
A
A
Pulley Ass'y
M Stopper
Sub Pully Ass'y
Stopper Catcher
Sub Pulley Ass'y
Timing Belt

· Hook the Timing Belts on the pulleys when the Stopper Catchers are in the positions shown in the figure.

Fig. 6-7-14 Timing Belt Replacement (2)

Adjustment

8. Timing Belt tension adjustment (Fig. 6-7-15)
Prepare the Tension Measuring Tool shown in Fig. 1.

Use the string or wire rope that is fit for 6 kgf forces.

(1) Hook the Tension Measuring Tool to the pulley of the Sub Pulley Ass'y as shown in the figure, and hook the Tension Scale on an end of the tool.

(2) Pull the tension scale horizontally in the direction indicated by arrow C, and keep holding the Tension Scale at the value within a range of the specification. Then, tighten two screws alternately to fasten the Sub Pulley Ass'y.

Specification : 49 N ± 4.9 N (5 kgf ± 0.5 kgf)

Note : Be sure to pull the Tension Scale horizontally. If not, a correct value cannot obtain.

(3) Remove the Tension Scale and Tension Measuring Tool.

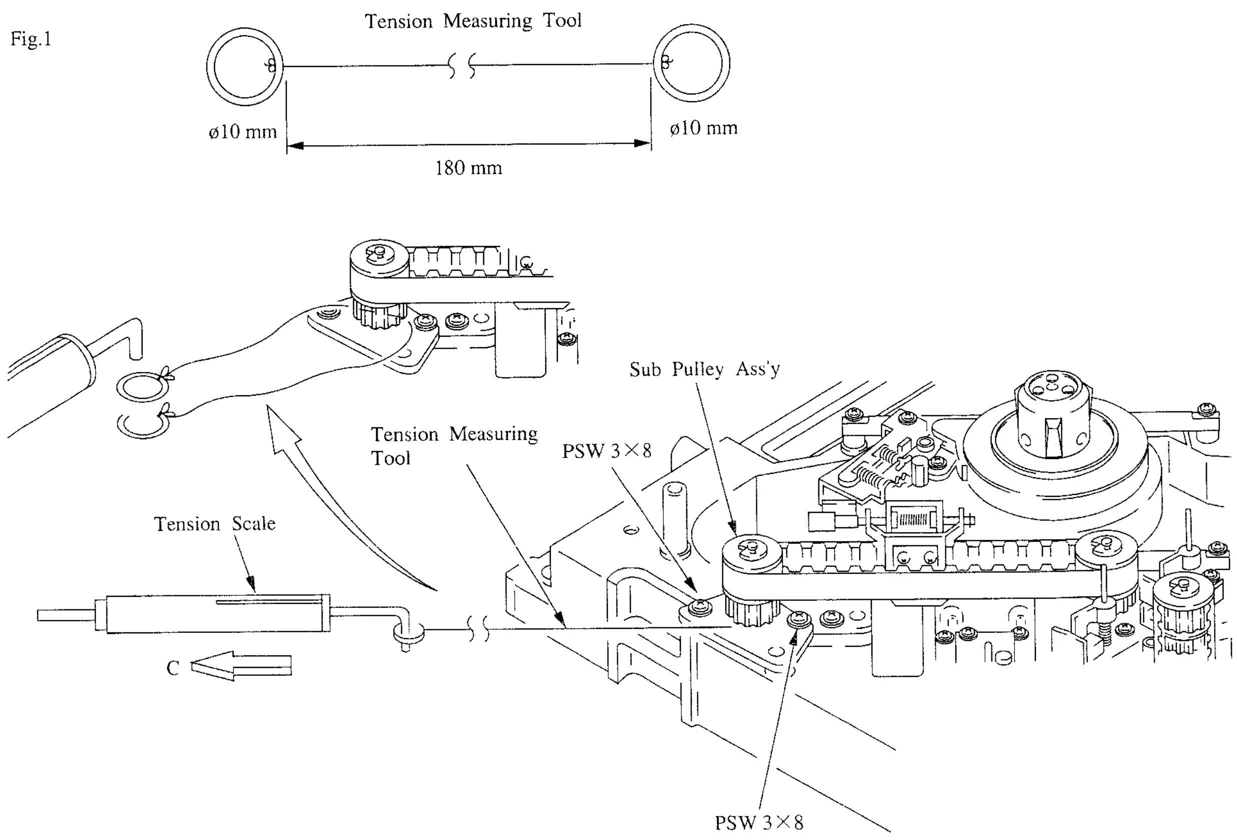


Fig.1
Tension Measuring Tool
ø10 mm
ø10 mm
180 mm
Sub Pulley Ass'y
Tension Measuring Tool
PSW 3×8
Tension Scale
C
PSW 3×8

Fig. 6-7-15 Timing Belt Tension Adjustment

9. Reel Shift Limiter Spring position check/adjustment

[Reel Shift Limiter Spring position check]

(1) Turn on the power, and set the Reel Shift Test Menu. Set the reel position to L once, and move it to M, and then turn off the power. Refer to Item C of Basic Knowledge of Section 6-7 (F31 mode).

(2) Turn the Worm Joint of the Reel Shift Motor in the direction indicated by arrow D with the finger from the back side of the Base Plate. Check the clearance S at a Limiter Spring (S) portion of the S Motor Frame as shown in the figure using the tickness gauge.

Specification.: clearance S
A 1.0 mm thickness gauge passes through.
A 1.1 mm thickness gauge does not pass through.

(3) Under the same condition as step (2), check the clearance T at a Limiter Spring (T) portion of the T Motor Frame as shown in the figure using the thickness gauge.

Specification.: clearance T
A 1.0 mm thickness gauge passes through.
A 1.1 mm thickness gauge does not pass through.

If this specification is not satisfied, perform step (4) and later.

[Reel Shift Limiter Spring position adjustment]

(4) Loosen two screws shown in Fig. 6-7-17 1/4 to 1/2 turn.

(5) Move the Limiter Holder in the direction indicated by arrow E with the finger so that the clearance T meets the specification. After adjustment, tighten two screws.

(6) Perform steps (2) and (3) again, and check the clearances S and T meet the specification.

(7) Apply a little amount of looking compound on the top of the two screws.

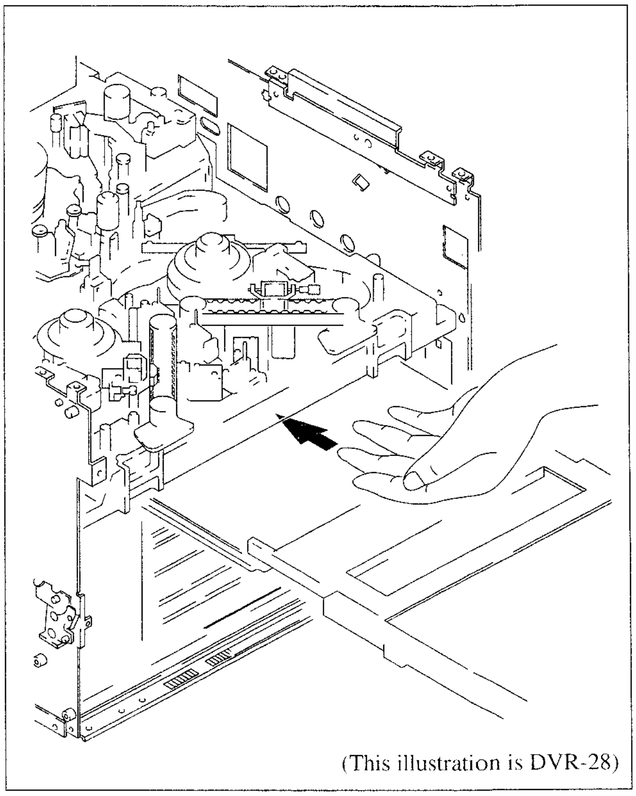

(This illustration is DVR-28)

Fig. 6-7-16 Reel Shift Limiter Spring Position Check/Adjustment (1)

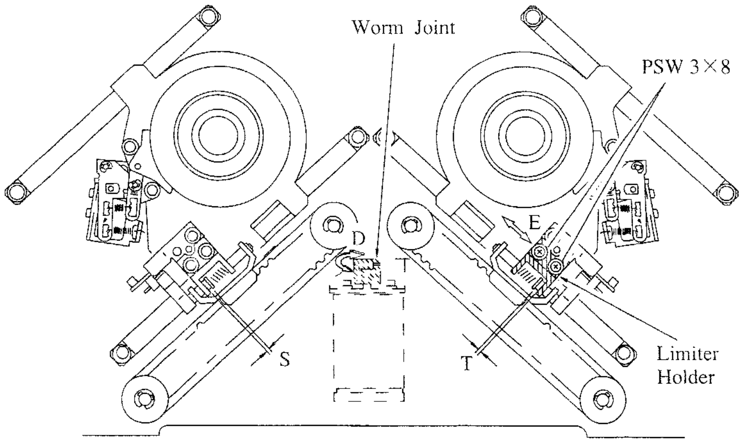


Fig. 6-7-17 Reel Shift Limiter Spring Position Check/Adjustment (2)

10. Reel Shift Limiter Sensor position check/adjustment
[Supply side Reel Limiter Sensor position check]

(1) Turn on the power, and set the Reel Shift Test Menu. Set the reel position to S once, and move it to M.
Refer to Item C of Basic Knowldge of Section 6-7 (F31 mode).

(2) Turn the Worm Joint of the Reel Shift Motor in the direction indicated by arrow C with the finger from the back side of the Base Plate, and adjust the clearance S at the Limiter Spring (S) of the S Reel Motor Frame to 1.0 mm by using a thickness gauge.
Check the bit display at E portion on the control panel.

```
XXXX    XXX*XXXXB
           └ E portion
```

The bit display just changes from 1 to 0.

- If this specification is satisfied, perform step (7) and later.
- If not, perform step (3) and later.

[S side Reel Limiter Sensor position adjustment]

(3) Loosen the screw shown in Fig. 6-7-18 1/4 to 1/2 turn.

(4) Check the bit display at E on the control panel.

(5) Insert the L-shaped wrench into hole F as shown in the figure, and move the Limiter Sensor Ass'y in the direction indicated by arrow G with the wrench until the bit display at E on the control panel just changes from 1 to 0.
After adjustment, tighten the screw.

(6) Perform step (2) again, and check that the specification is met.

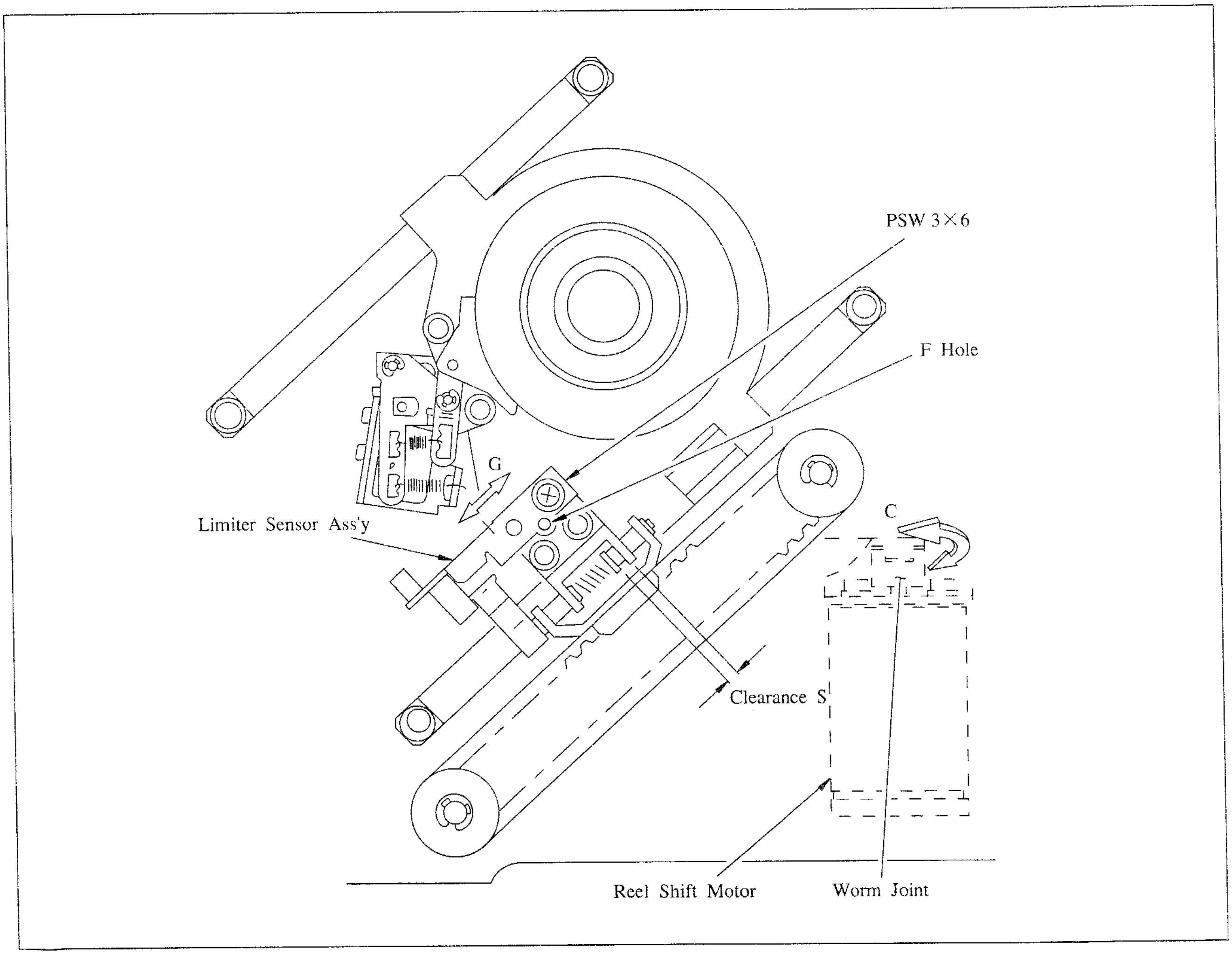


Fig. 6-7-18 Reel Shift Limiter Sensor Position Check/Adjustment (Supply-side))

[Take-up side Reel Limiter Sensor position check]

(7) Move the reel position from M side to S side (F31 mode).

(8) Turn the Worm Joint of the Reel Shift Motor in the direction indicated by arrow D with the finger from the back side of the Base Plate, and adjust the clearance T at the Limiter Spring (T) of the T Reel Motor Frame to 1.0 mm by using a thickness gauge.
At this time, check the bit display at H portion on the control panel.

```
XXXX    XX*XXXXXB
          └─H portion
```

The bit display just changes from 1 to 0.

- If this specification is satisfied, perform step (13) and later.
- If not, perform step (9) and later.

[T side Reel Limiter Sensor position adjustment]

(9) Loosen a screw shown in Fig. 6-7-19 1/4 to 1/2 turn.

(10) Check the bit display at H on the control panel.

(11) Insert the L-shaped wrench into hole J as shown in the figure, and move the Limiter Sensor Ass'y in the direction indicated by arrow K with the wrench until the bit display at H on the control panel just changes from 1 to 0.
After adjustment, tighten the screw.

(12) Perform step (8) again, and check that the specification is met.

(13) Turn off the power.

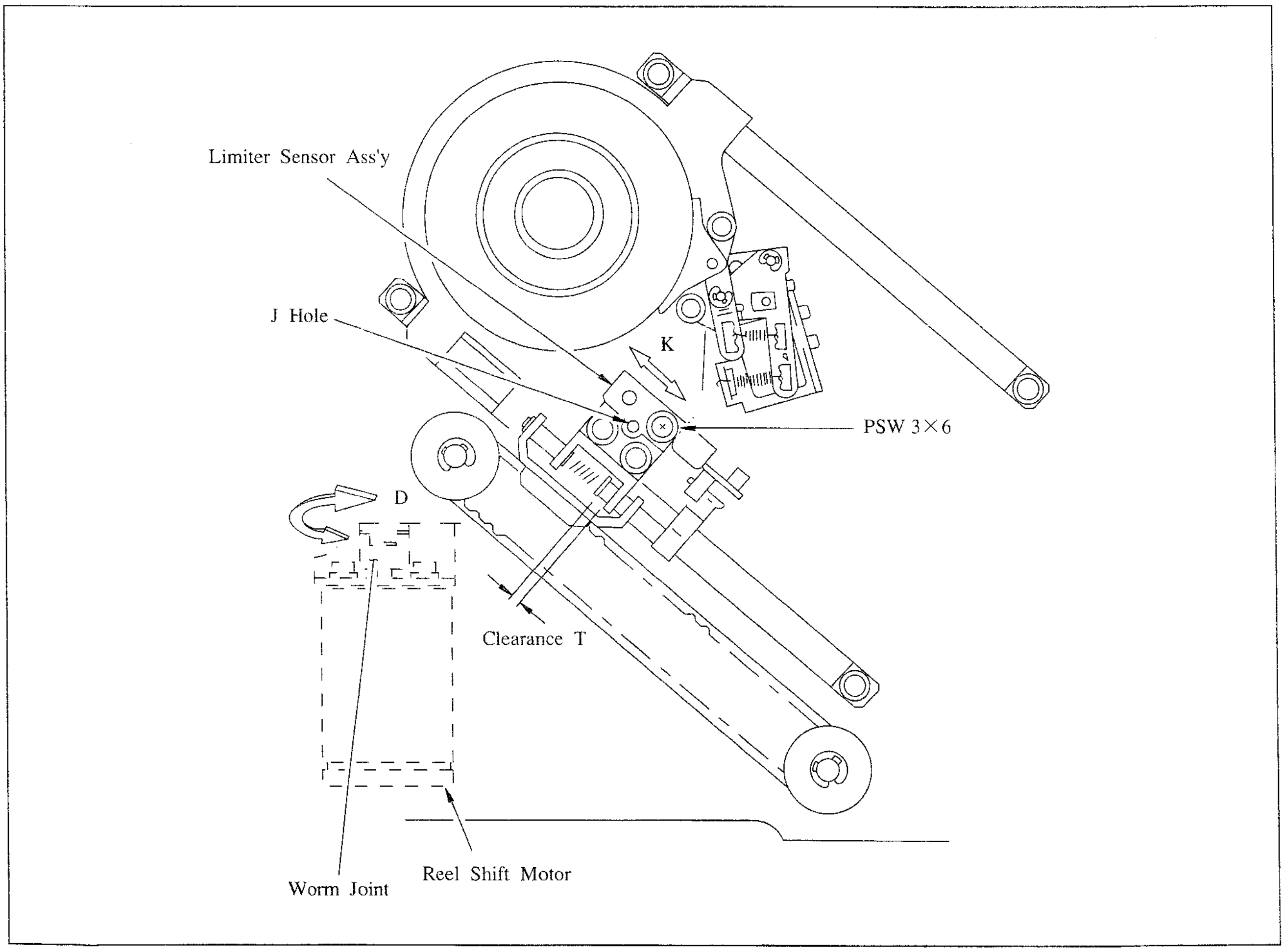


Fig. 6-7-19 Reel Shift Limiter Sensor Position Check/Adjustment (Take-up-side)

11. Reel position NOV-RAM data input
    [procedures]
    (1) Turn on the power, and set the Reel Shift Test Menu.
        [Reel Shift Test Menu Setting Method]
        Refer to Item C of the Basic Knowledge of Section 6-7 (F31 mode).

    (2) Set the reel position to S side until the Limiter Spring (T) of the T Motor Frame is just starting compression. (Fig. 6-7-20)
        At this time, make a note of data E portion (data (1)) on the control panel.

        XX* * XXXXXXXXXB
        E portion

    (3) Move the reel position from S side to M side until the Limiter Spring (S) of the S Motor Frame is just starting compression. (Fig. 6-7-21)
        At this time, make a note of data E portion (data (2)) on the control panel.

        XX* * XXXXXXXXXB
        E portion

    (4) Move the reel position from M side to L side until the Limiter Spring (S) of the S Motor Frame is just starting compression. (Fig. 6-7-21)
        At this time, make a note of data E portion (data (3)) on the control panel.

        XX* * XXXXXXXXXB
        E portion

    (5) Move the reel position from L side to M side until the Limiter Spring (T) of the T Motor Frame is just starting compression. (Fig. 6-7-20)
        At this time, make a note of data E portion (data (4)) on the control panel.

        XX* * XXXXXXXXXB
        E portion

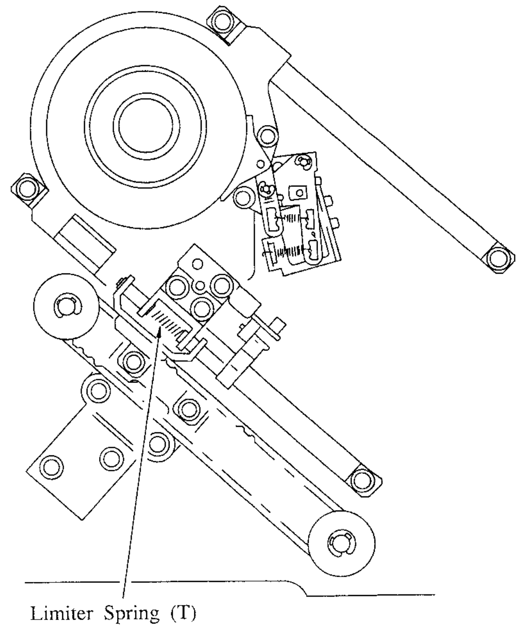


Fig. 6-7-20 Limiter Spring (T)

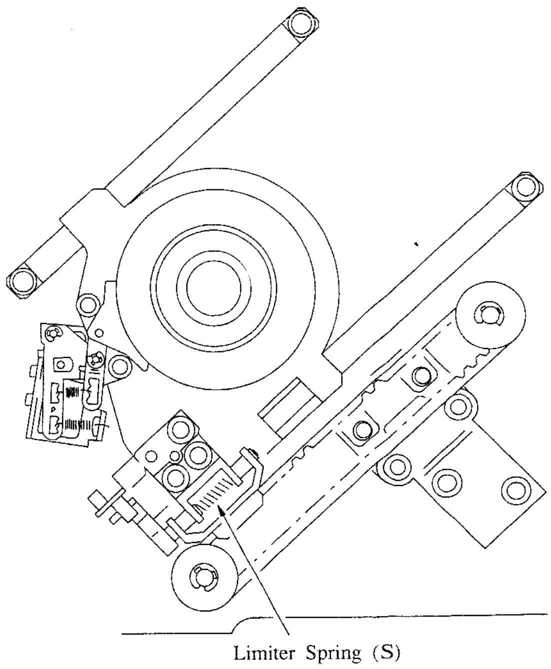


Fig. 6-7-21 Limiter Spring (S)

(6) Press the keys on the control panel in the following order:

[BKDV-101]
F7 ($), F1 (A), 8 , F1 (A), F3 (C), SET

[BKDV-200 series]
F2 ($)
INPUT CHECK + 0 (A), 8
INPUT CHECK + 0 (A), INPUT CHECK + 2 (C),
SET

A and C be inputted by selecting it the search dial and F1 (ALPH SET) key as well. (Refer to Section 6-(1)-4.)

- The control panel displays the following:
  $A8AC XX-**
  At **, input the data (1) that has been noted at step (2).

- The control panel displays the following:
  $A8AD XX-**
  At **, input the data (4) - 30 (Hex) that has been noted at step (5).
  (Example) INPUT data = 70 - 30 = 40 (Hex)
  Data (4)

- The control panel displays the following:
  $A8AE XX-**
  At **, input the data (2) + 30 (Hex) that has been noted at step (3).
  (Example) INPUT data = 72 + 30 = A2 (Hex)
  Data (2)

- The control panel displays the following:
  $A8AF XX-**
  At **, input the data (3) that has been noted at step (4).

  After writing the data, press the following keys.
  BKDV-101: SET
  BKDV-200 Series: SET of the monitor select key

- Transfer the written data to NOV-RAM.
  [BKDV-101]
  F10 (NVW), SET

  [BKDV-200 series]
  ① F4 (NVW)
  ② SET of the monitor select key

  When the control panel displays "PUSH NVWR SW", press the F3 (/) key.
  At this time, make sure that none of the address data other than that shown below has not been changed:
  Address data to be changed:
  A8AC to A8AF, A8FE, and A8FF
  Then press the NVWR switch S71 of the SSP-07 Board, and check that "READY" is displayed.

- Carry out the on of the following step 5 and reset the machine.
  [BKDV-101]
  (i) F8 (=), 0 , SET
  (ii) Turn off the power

  [BKDV-200 series]
  (i) SHIFT, F4 (=), 0, SET
  (ii) Turn off the power

(7) Set the Reel Shift Test Menu in the F21 mode, then perform operation check of the L, M, and S positions.
Refer to Item C of the Basic Knowledge.

(8) Turn OFF the power.

12. Remove the MD-62 Board and EX-185 Extension Board from the unit, then reinsert the MD-62 Board.

13. Set Bit2 of S72 of the SSP-07 Board to OFF.

14. TTP Front Cover installation
    - Install the TTP Front Cover in the reverse order of step 2.

15. Cassette Compartment Ass'y installation
    Refer to Section 6-5.

16. Check operation of the Reel Shift.
    - Insert the L, M and S cassette tapes one at a time, and then check that reel shift is performed smoothly.
    - Check that the tape travels normally.

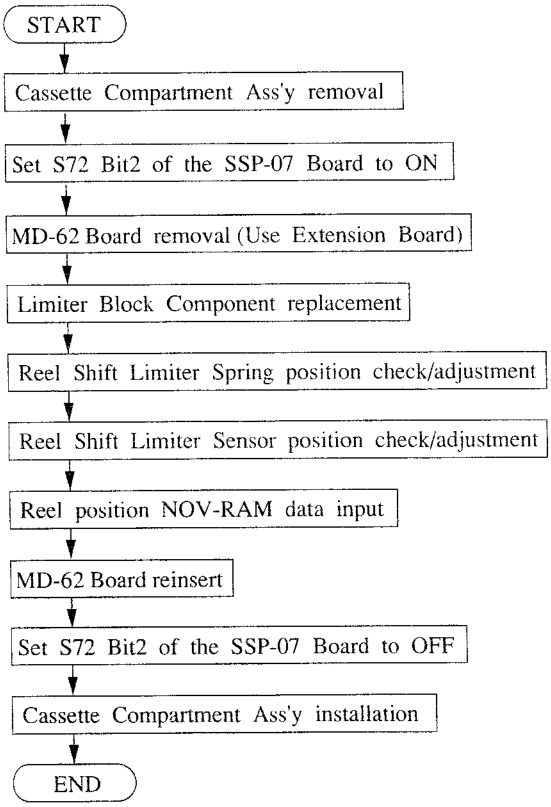
6-7-5. Motor Frame Limiter Block Replacement

Basic Knowledge

A. Prepare the following tools for adjustments.

- EX-185 Extention Board (attachment DVR-28)
  Sony Parts No.: A-6001-015-A
- L-shaped hexagonal wrench
  Sony Parts No.: J-6041-700-C
  7-700-736-00
- Thickness gauge
  Sony Parts No.: J-6041-670-A
- Molyton grease No.320
  Sony Parts No.: 7-662-001-41
- Cleaning piece
  Sony Parts No.: 2-034-697-00
- Cleaning liquid (or the equivalent)
  Sony Parts No.: 9-919-573-00
- Locking compound (Screw lock)

B. Replacement flowchart


START
Cassette Compartment Ass'y removal
Set S72 Bit2 of the SSP-07 Board to ON
MD-62 Board removal (Use Extension Board)
Limiter Block Component replacement
Reel Shift Limiter Spring position check/adjustment
Reel Shift Limiter Sensor position check/adjustment
Reel position NOV-RAM data input
MD-62 Board reinsert
Set S72 Bit2 of the SSP-07 Board to OFF
Cassette Compartment Ass'y installation
END

Removal

1. Cassette Compartment Ass'y removal
   Refer to Section 6-5.

2. Set Bit2 of S72 of the SSP-07 Board to On. Refer to Item D of Basic Knowledge of Section 6-7.

   Note: Set Bit2 of S72 of the SSP-07 Board to OFF after the adjustment.

3. Remove the MD-62 Board (Plug-in Bourd) of the Card Rack (1) from the unit, and extend it with the EX-185 Extention Board. Reinsert it into the unit.
   [Extension board use method]
   Refer to Section1-6.

4. Turn on the power, and set the Reel Shift Test Menu of the SP mode.
   Press the keys on the control panel in the following sequeuce.
   [BKDV-101]
   TEST, F6 (CHECKER),
   F1 (SP),
   F6 (F), 2, 1, SET

   [BKDV-200 series]
   ① SHIFT + SET UP
   ② ENTRY + center key + search dial (or ∨ key) to enter the <TEST> menu.
   Turn the search dial clockwise or press ∨ key to select 807. [CHECKER MODE.]
   ③ Press the > key to the EXECUTE.
   ④ Press the ∧ key to enter CHECKER mode.
   ⑤ Entry F21 by pressing the monitor select keys in the following sequeuce.
   INPUT CHECK + 5 (F), 2, 1, SET

   F can be inputted by selecting it the search dial and F1 (ALPH SET) key as well. (Refer to Section 6-(1)-4.)

5. Set the reel position to S once, and next set it to M, and then turn off the power.

6. Motor Frame Limiter Block removal (Fig. 6-7-22)

   (1) Remove the E ring as shown in the figure.

   Note: When removing the E ring, be careful not to allow the E ring to fall into the unit.

   (2) While pulling out the Limiter Shaft Ass'y in the direction indicated by arrow A, remove the Limiter Spring and Limiter Collar in order.

   *3: The shape of the Limiter Shaft Ass'y varies with the serial numbers of the units. But the replacement procedures are all the same.

   Applicable Serial Numbers

*3:	DVR-28 (UC)	S/N	12101 and higher
	DVR-28P (UC)	S/N	11201 and higher
	DVR-28P (EK)	S/N	11701 and higher

   - When the replacement of the Limiter Sensor Ass'y (PC-42 Board) is necessary, remove a screw and the Limiter Sensor Ass'y from the unit. (Fig. 2)

Replacement/Installation

7. Replace the worn-out parts, and reassemble these parts in the reverse order of step 6.

   - Before reassembling, clean the mounting surfaces of the Limiter Shaft Ass'y, Limiter Collar and Limiter Base with a cleaning piece moistened with cleaning liquid.
   - After reassembling, smear a little amount of Molyton grease on the portions shown in the figure, and rotate the Limiter Shaft Ass'y in the direction indicated by arrow B two to three turns with the finger so that the grease spreads on the whole surfaces. (Fig. 1)

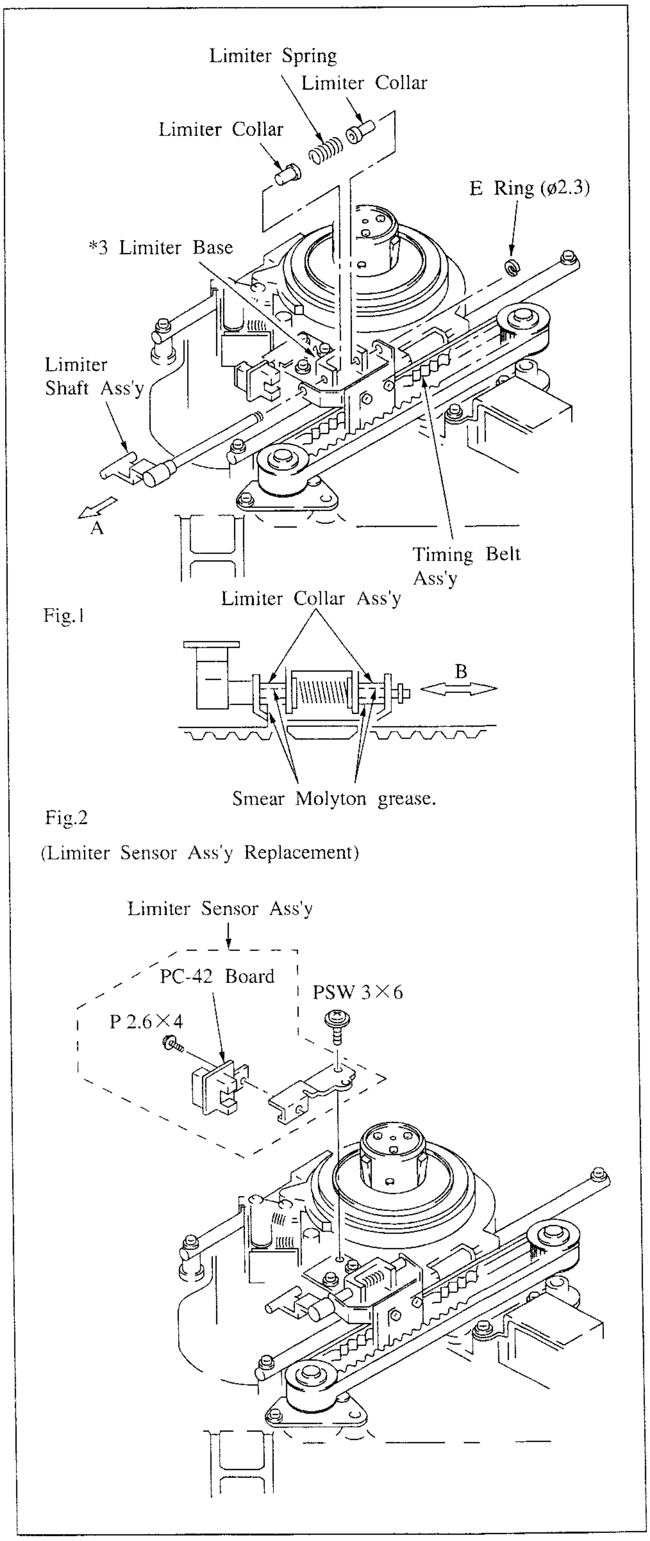

Limiter Spring
Limiter Collar
Limiter Collar
E Ring (ø2.3)
*3 Limiter Base
Limiter Shaft Ass'y
A
Timing Belt Ass'y
Limiter Collar Ass'y
Fig.1
B
Smear Molyton grease.
Fig.2
(Limiter Sensor Ass'y Replacement)
Limiter Sensor Ass'y
PC-42 Board
PSW 3×6
P 2.6×4

Fig. 6-7-22 Motor Frame Limiter Block Replacement

Adjustment

8. Reel Shift Limiter Spring position check/adjustment
   Refer to Section 6-7-4, step 9.

9. Reel Shift Limiter Sensor position check/adjustment
   Refer to Section 6-7-4, step 10.

10. Reel position NOV-RAM data input
    Refer to Section 6-7-4, step 11.

11. Remove the MD-62 Board and EX-185 Extension Board, and reinstall the MD-62 Board to the original position.

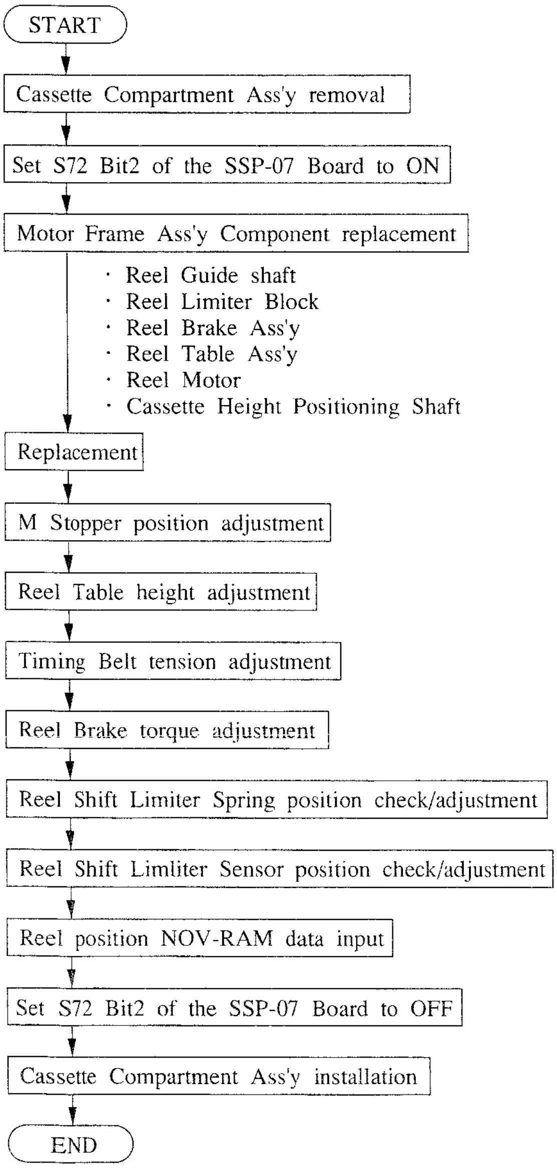
12. Set Bit2 of S72 of the SSP-07 Board to OFF.

13. Cassette Compartment Ass'y installation
    Refer to Section 6-5.

6-7-6. Motor Frame Ass'y Replacement

Basic Knowledge

A. Replacement flowchart


START
Cassette Compartment Ass'y removal
Set S72 Bit2 of the SSP-07 Board to ON
Motor Frame Ass'y Component replacement
· Reel Guide shaft
· Reel Limiter Block
· Reel Brake Ass'y
· Reel Table Ass'y
· Reel Motor
· Cassette Height Positioning Shaft
Replacement
M Stopper position adjustment
Reel Table height adjustment
Timing Belt tension adjustment
Reel Brake torque adjustment
Reel Shift Limiter Spring position check/adjustment
Reel Shift Limliter Sensor position check/adjustment
Reel position NOV-RAM data input
Set S72 Bit2 of the SSP-07 Board to OFF
Cassette Compartment Ass'y installation
END

B. Prepare the following tools for adjustments.

- EX-185 Board (attachment DVR-28)
  Sony Parts No.: A-6001-015-A
- Reference Plate (28)
  Sony Parts No.: J-6257-390-A
- Tension Scale 5 kg
  Sony Parts No.: J-6041-640-A
- Thickness gauge
  Sony Parts No.: J-6041-670-A
- Cleaning piece
  Sony Parts No.: 2-034-697-00
- Cleaning liquid (or the equivalent)
  Sony Parts No.: 9-919-573-00
- L-shaped hexagonal wrench set
  Sony Parts No.: J-6041-700-C
  7-700-736-00
- Molyton grease No.320
  Sony Parts No.: 7-662-001-41
- Tension Measuring Tool
  String or wire rope that is fit for 6 kg forces.
- Locking compound (Screw lock)

C. The procedures of the part replacement vary with the serial numbers of the units.
The details of *1, *2, *3 and *4 marks are following.

Applicable Serial Numbers

*1:	DVR-28 (UC)	S/N	10001 through 11999
	DVR-28P (UC)	S/N	10001 through 11199
	DVR-28P (EK)	S/N	10001 through 11699
*2:	DVR-28 (UC)	S/N	12001 and higher
	DVR-28P (UC)	S/N	11201 and higher
	DVR-28P (EK)	S/N	11701 and higher
*3:	DVR-28 (UC)	S/N	12101 and higher
	DVR-28P (UC)	S/N	11201 and higher
	DVR-28P (EK)	S/N	11701 and higher
*4:	DVR-28 (UC)	S/N	12201 and higher
	DVR-28P (UC)	S/N	11201 and higher
	DVR-28P (EK)	S/N	11801 and higher

Removal

1. Cassette Compartment Ass'y removal
   Refer to Section 6-5.

2. Set Bit2 of S72 of the SSP-07 Board to ON.
   Refer to Item D of Basic Knowledge of Section 6-7.

   Note: Be sure to set No.2 of S72 of the SSP-07 Board to OFF after the adjustment.

3. Turn on the power, and set the Reel Shift Test Menu.
   [Reel Shift Test Menu Setting Method]
   Refer to Item C of Basic Knowledge of Section 6-7.
   (F31 mode)

4. Set the reel position to S once, and next set it to M, and then turn off the power.

5. Motor Frame Ass'y removal (Fig. 6-7-23)
   (1) Remove the two screws fixing the Sub Pulley Ass'y. Then remove the Sub Pulley Ass'y.
   (2) Remove the Timing Belt from the Pulley Ass'y.
   (3) Disconnect the Flexible Card Wire from the Motor Board.
   [Flexible Card Wire disconnection/insertion method]
   Refer to Section 2-5-4.

   Note: Handle the Flexible Card Wire with extra care because bending the wire can shorten its service life extremely.

   (4) Remove the four screws fixing the Reel Guide Shafts (A) and (B), then remove the Motor Frame Ass'y by lifting it horizontally in the direction indicated by arrow B.

   Note: When removing the Motor Frame Ass'y, be careful not to tilt it. If it tilts, shafts (A) and (B) might slide off.

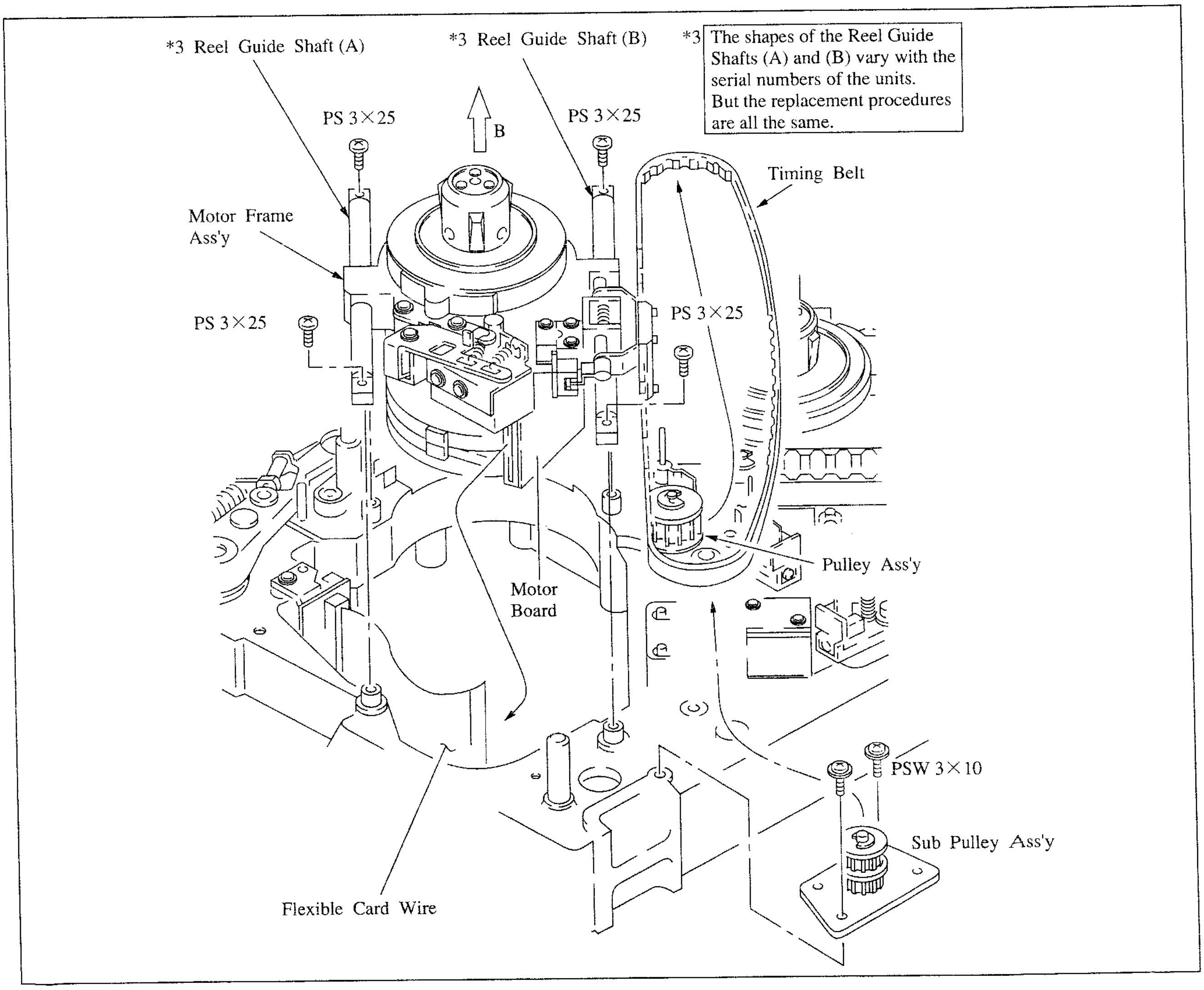

*3 Reel Guide Shaft (A)
*3 Reel Guide Shaft (B)
*3 The shapes of the Reel Guide Shafts (A) and (B) vary with the serial numbers of the units. But the replacement procedures are all the same.
PS 3×25
B
PS 3×25
Timing Belt
Motor Frame Ass'y
PS 3×25
PS 3×25
Pulley Ass'y
Motor Board
PSW 3×10
Sub Pulley Ass'y
Flexible Card Wire

Fig. 6-7-23 Motor Frame Ass'y Replacement

6. Motor Frame Ass'y components removal (Fig. 6-7-24)

[Removal Procedure]

(1) Reel Guide Shaft: Pull it out in the direction indicated by arrow C.

(2) Reel Brake Ass'y: Remove the two screws fixing the Reel Brake Ass'y, then remove the Reel Brake Ass'y. Disconnect the solenoid harness from the Motor Board.

(3) Reel Shift Limiter Block: Remove the two screws fixing the Reel Shift Limiter Block, then remove the Reel Shift Limiter Block.

(4) Reel Table Ass'y: Loosen the two screws fixing the Reel Table Ass'y 2 to 3 turns, and remove it in the direction indicated by arrow D. Use a hexagonal wrench (across flats of 2 mm).

(5) Reel Motor: Remove the four screws fixing the Motor Frame, then remove the Reel Motor in the direction indicated by arrow E.

Note: There may be a spacer inserted (at the side of any hole out of the four holes) between the Reel Motor and Motor Frame. When removing the Reel Motor, take care not to allow the spacer to fall. When replacing the Reel Motor, the spacer should be reinserted in the same place.

(6) Cassette Height Positioning Shaft: Remove it with a box wrench. Use a box wrench (across flats of 5.5 mm).

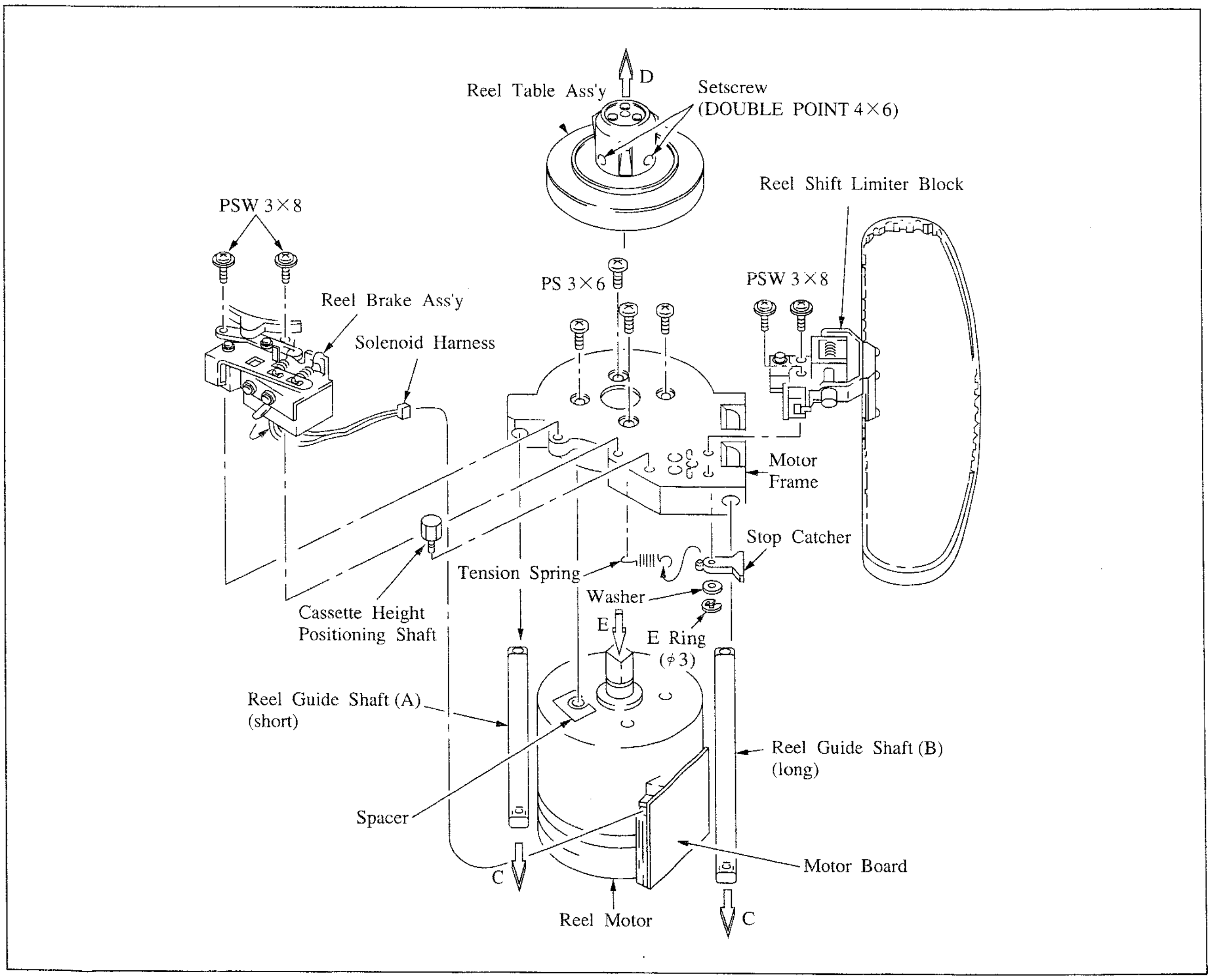

Reel Table Ass'y
D
Setscrew
(DOUBLE POINT 4×6)
Reel Shift Limiter Block
PSW 3×8
PS 3×6
PSW 3×8
Reel Brake Ass'y
Solenoid Harness
Motor
Frame
Stop Catcher
Tension Spring
Washer
E
E Ring
(φ3)
Cassette Height
Positioning Shaft
Reel Guide Shaft (A)
(short)
Reel Guide Shaft (B)
(long)
Spacer
Motor Board
C
Reel Motor
C

Fig. 6-7-24 Motor Frame Ass'y Components

Replacement/Installation

7. Clean the mounting surfaces.
   - Clean the mounting surfaces of the Motor Frame and components with a cleaning piece moistened with cleaning liquid.
   - Clean also the surfaces of the Pulley Ass'y and Sub Pulley Ass'y where they touch the Timing Belt.

8. Reassemble the components of Motor Frame Ass'y.
   - Reassemble the components of the Motor Frame in the reverse order of step 6.

9. M Stopper Ass'y removal (Fig. 6-7-25)
   - Remove the two screws fixing the M Stopper Ass'y (with spring washers and flat washers), then remove the M Stopper Ass'y.
     Put the M Stopper Ass'y in a place where it will not hamper the work.
     Use a hexagonal wrench (across flats of 2 mm).
     *3: The shape of M Stopper Ass'y varies with the serial numbers of the units. But the replacement procedures are all the same.

Applicable Serial Numbers

*3:	DVR-28 (UC)	S/N	12101 and higher
	DVR-28P (UC)	S/N	11201 and higher
	DVR-28P (EK)	S/N	11701 and higher

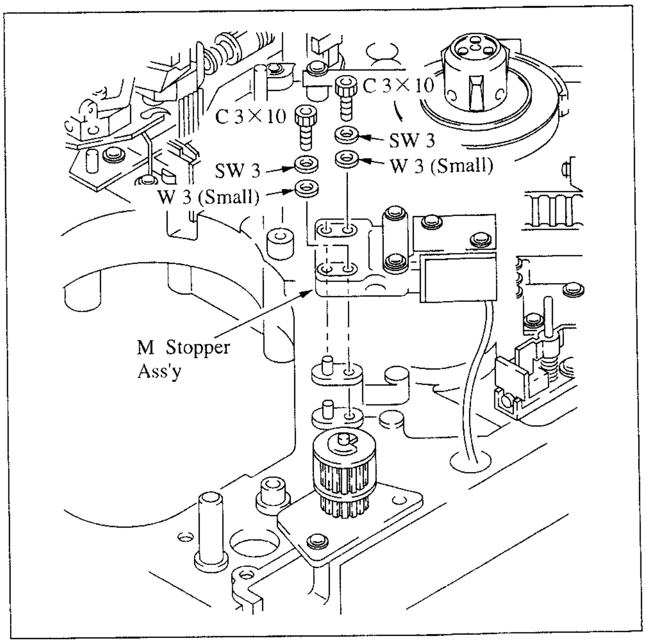


Fig. 6-7-25 M Stopper Ass'y Removal

10. Motor Frame Ass'y installation (Fig. 6-7-26)
    (1) Holding the Motor Frame horizontally, and fit four mounting holes (a, b, c and d) of the Reel Guide Shafts (A) and (B) to four screw holes (a, b, c and d) on the Base Plate.

    (2) Tighten the four screws that have been removed in (4) of step 4 into the holes a, b, c and d of the Reel Guide Shaft (A) and (B), temporarily.

    (3) Move the Motor Frame in the direction indicated by arrow F (S-cassette position) with your finger, and tighten two screws into holes a and c.

    (4) Move the Motor Frame in the direction indicated by arrow G (L-cassette position) with your finger, and tighten two screws into holes b and d.

    (5) Move the Motor Frame in the direction indicated by arrows F and G with the finger, and check the movement is smooth. If not, perform steps (2) through. (4) again.

    (6) Connect the Flexible Card Wire to the Motor Board.
    [Flexible Card Wire disconnection/insertion method]
    Refer to Section 2-5-4.

Note: Handle the Flexible Card Wire with extra care because bending the wire can shorten its service life extremely.

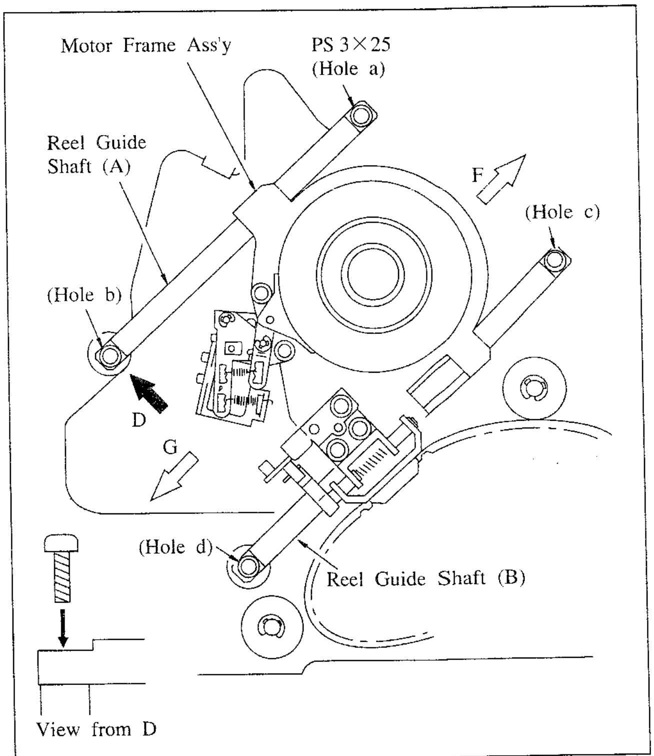


Fig. 6-7-26 Motor Frame Ass'y Installation

11. M Stopper Ass'y installation (Fig. 6-7-27)
    (1) Move the Motor Frame Ass'y in the direction indicated by arrow F with the finger.

    (2) Clean the mounting surfaces of the M Stopper Ass'y and Base Plate with a cleaning piece moistened with cleaning liquid.

    (3) Install the guide holes of the M Stopper Ass'y to the guide pins of the Base Plate.

    (4) Install the M Stopper Ass'y with two screws (with spring washers and flat washers) that have been removed in step 9, but do not tighten them completely. (Fig. 6-7-25)
    Use a hexagonal wrench (across flats of 2 mm).

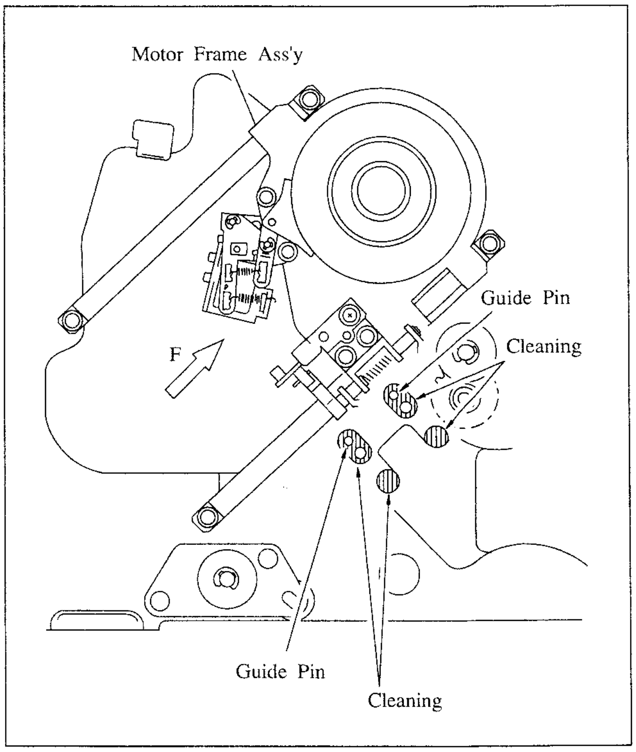


Fig. 6-7-27 M Stopper Ass'y Installation

12. M Stopper position adjustment (Fig. 6-7-28)
   (1) Clean the contacting surfaces of the Reference Plate Tool and Base Plate with a cleaning piece moistened with cleaning liquid.

   (2) Place the Reference Plate Tool on the Base Plate as shown in the figure.

   (3) Loosen two screws 1 to 2 turns from the temporarily tightened position.
   Use a hexagonal wrench (across flats of 2 mm).

   (4) Insert thickness gauges (0.5 mm) into clearances S and T between the Reference Plate Tool and outer circumference (clearance S and T) of the Reel Table. Light push the M Stopper Ass'y in the direction indicated by arrow H with the finger, and then tighten two screws. Pull out the thickness gauges.

   (5) Check that the clearances S and T meet the following specification.

   Specifcation.: clearances S and T
   A 0.5 mm thickness gauge passes through
   A 0.7 mm thickness gauge does not pass through

   (6) Remove the Reference Plate Tool from the Base Plate.

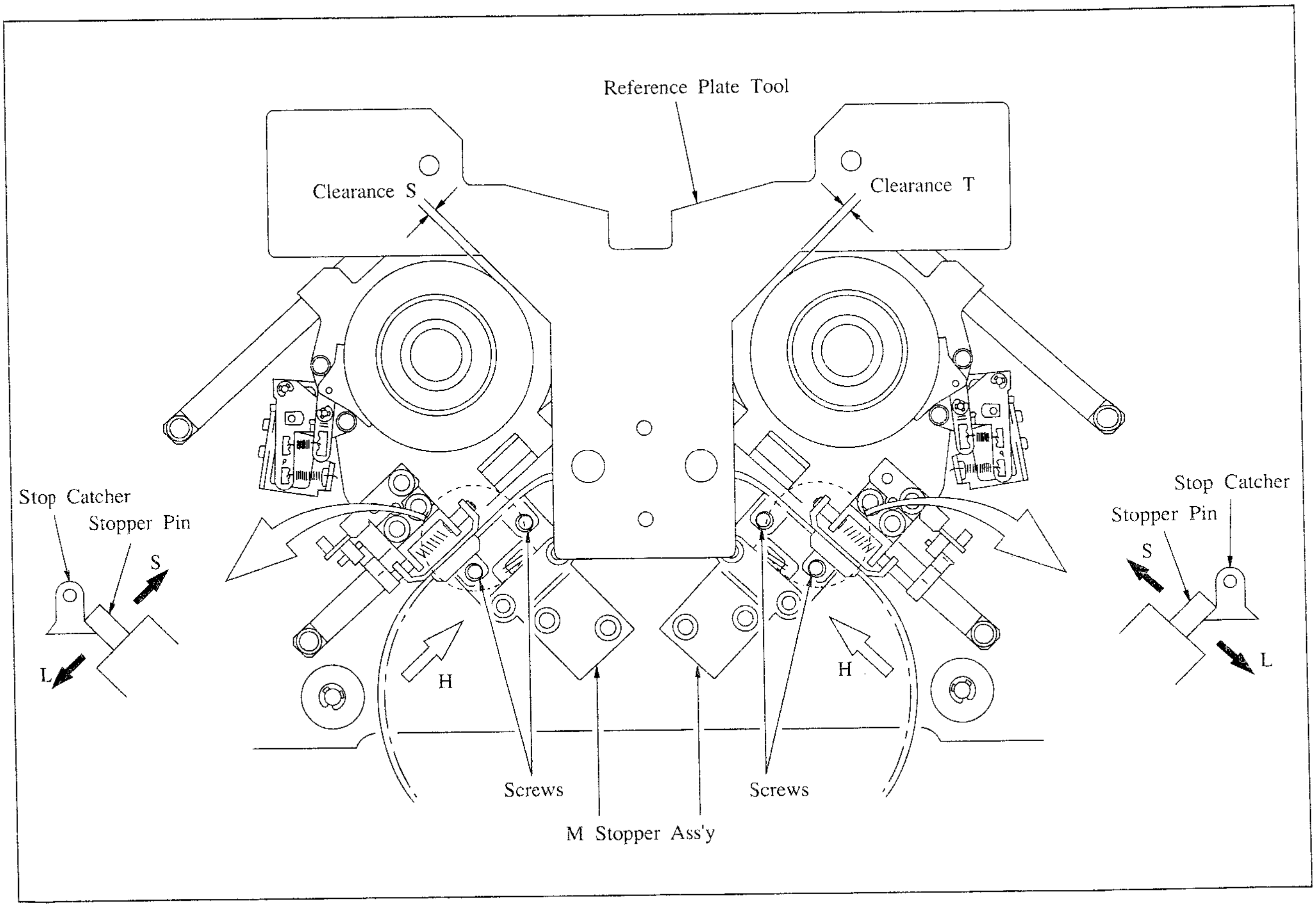

Reference Plate Tool
Clearance S
Clearance T
Stop Catcher
Stopper Pin
S
L
Stop Catcher
Stopper Pin
S
L
H
H
Screws
Screws
M Stopper Ass'y

Fig. 6-7-28 M Stopper Position Adjustment

13. Reel Table height adjustment
    Refer to Section 6-7-1.

14. Timing Belt installation
    Refer to Section 6-7-4.

15. Timing Belt tension adjustment
    Refer to Section 6-7-4.

16. Reel Brake torque adjustment
    Refer to Section 6-7-1.

17. Reel Shift Limiter Spring position check
    Refer to Section 6-7-4.

18. Reel Shift Limiter Sensor position check
    Refer to Section 6-7-4.

19. Reel position NOV-RAM data input
    Refer to Section 6-7-4.

20. Set Bit2 of S72 of the SSP-07 Board to OFF.

21. Cassette Compartment Ass'y installation
    Refer to Section 6-5.

6-8. REEL TABLE DRIVE BLOCK COMPONENT REPLACEMENT

Basic Knowledge

A. The replacement of Reel Table Drive Block components is described in accordance with the procedure below.

6-8-1. Reel Table Shift Motor Ass'y Replacement
6-8-2. Sub-Pulley Ass'y Replacement (at Timing Belt Driven Side)
6-8-3. Pulley Ass'y Replacement (at Timing Belt Driving Side)
6-8-4. Reel Table M Stopper Ass'y Replacement
6-8-5. Reel Shift Potentiometer Replacement

B. Carry out Pulley Shafts (S) and (T) Phase Check before replacing the Reel Table Drive Block components at this section.

[Phase Check Procedures]
① Select Reel postion to L position. Refer to step C at this section about the selecting of the Reel position.
② Check the imagined line from the groove (or marking) of the Pulley Shaft (S) to the groove (or marking) of the Pulley Shaft (T) is parallel against the imagined line from the center of the Reel Table Shaft (S) to the center of the Reel Table Shaft (T).

In the case of the grooves or markings are not on the surface of the Pulley Shafts.

Use the grooves or markings on the surface of the Pulley Shafts for the Pulley Shafts (S) and (T) Phase Check. The Pulley Shafts (S) and (T) Phase Check is the guide of the Reel Table Ass'y (S) and (T) Position Check.

The units of the following serial numbers haven't the grooves or markings on the surface of the Pully Shafts.

Applicable Serial Numbers

*3:	DVR-28 (UC)	S/N	12101 and higher
	DVR-28P (UC)	S/N	11201 and higher
	DVR-28P (EK)	S/N	11701 and higher
*4:	DVR-28 (UC)	S/N	12201 and higher
	DVR-28P (UC)	S/N	11201 and higher
	DVR-28P (EK)	S/N	11801 and higher

In this case, mark on the surface of the Pulley Shafts the following procedures.
① Select the Reel position to the L position.
② Mark two parralel lines on the surface of the Pulley Shafts (S) and (T) against the imagined line from the center of the Reel Table Shaft (S) to the center of the Reel Table Shaft (T) as shown in Figure 6-8 (a).

C. Test menu setting
[Test Menu setting procedures for the Reel Shift in the F31 mode]

Press the following keys on the control panel in this order:
[BKDV-101]
TEST , F6 (CHECKER),
Select the SP Checker Mode.
F1 (SP)
Set the Reel Shift Test Mode in the SP Checker Mode.
F6 (F), 3 , 1 , SET

[BKDV-200 series]
① SHIFT + SET UP
② ENTRY + center key + search dial (or V key) to enter the <TEST> menu.
Turn the search dial clockwise or press V key to select 807. [CHECKER MODE.]
③ Press the > key to move the cursor to EXECUTE.
④ Press the Λ key to enter CHECKER mode.
⑤ Enter F31 by pressing the monitor select keys in the following sequence.
INPUT CHWCK + 5 (F), 3, 1, SET

F can be input by selecting it the search dial and F1 (ALPH SET) Key as well. (Refer to Section 6-(1)-4.)

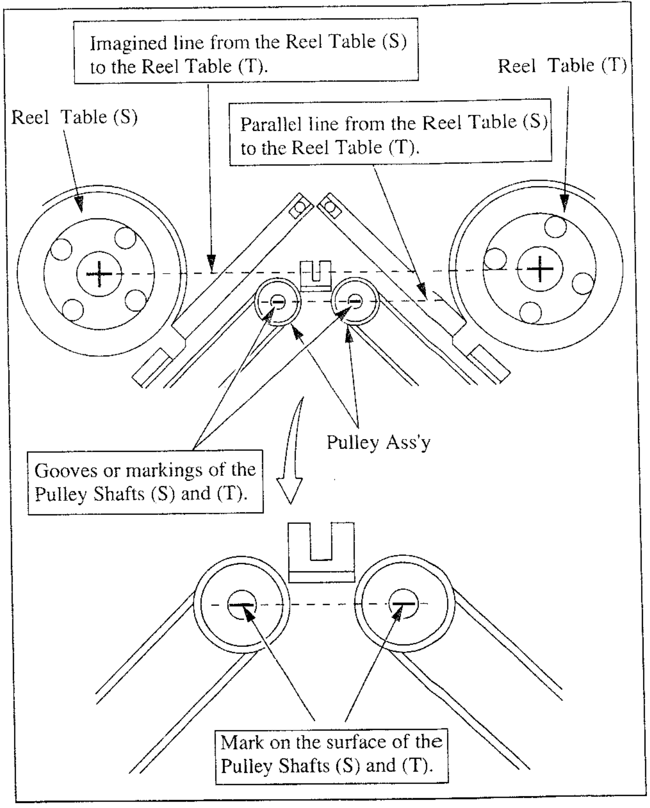

Imagined line from the Reel Table (S) to the Reel Table (T).
Reel Table (T)
Reel Table (S)
Parallel line from the Reel Table (S) to the Reel Table (T).
Pulley Ass'y
Gooves or markings of the Pulley Shafts (S) and (T).
Mark on the surface of the Pulley Shafts (S) and (T).

Fig. 6-8 (a) Pulley Shafts (S) and (T) Marking

Notes on using the F31 mode Reel Shift Test Menu:
Since sensor information is not used in the F31 mode, automatic power on or off of the motor and variable power control are not performed in this mode. Thus operation continues while the Cursor Keys (< and > Keys) is pressed. Therefore, handle mechanisms such as the limiter, stopper, and gears with extra care to avoid damage.

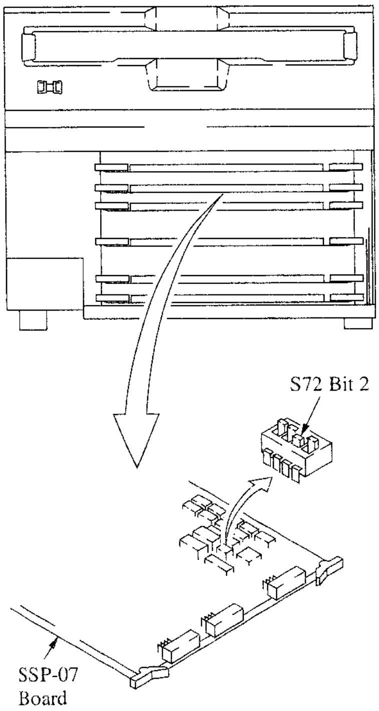
[Cursor key operation]

After performing the above mentioned setting, the reel position changes to the following positions according to cursor key operation:

[<] or [>] : Reel position changes S to M, and L to M.
[<] + [ ] : Reel position changes S to L, and M to L.
[ ] + [>] : Reel position changes L to S, and M to S.

D. Performing the following operation enables all adjustments of the Reel Table Drive Block to be performed when the Cassette Compartment Ass'y is not installed.

- Set Bit 2 of S72 on the SSP-07 Board to ON.


S72 Bit 2
SSP-07
Board

NOTE: After carring out the above step, the following WARNING MESSAGE is displayed on the Display.

> **[NO CASSETTE COMPARTMENT MODE]**
> **S72-2 of SSP/SP board is switched ON**

Turn S72 bit2 of switch to OFF after the adjustment, and the WARNING MESSAGE disappears on the Display.

The message is indicated on the display of the VTR that the ROM software versions on the SSP-07 Board are higher than 6.0 versions.

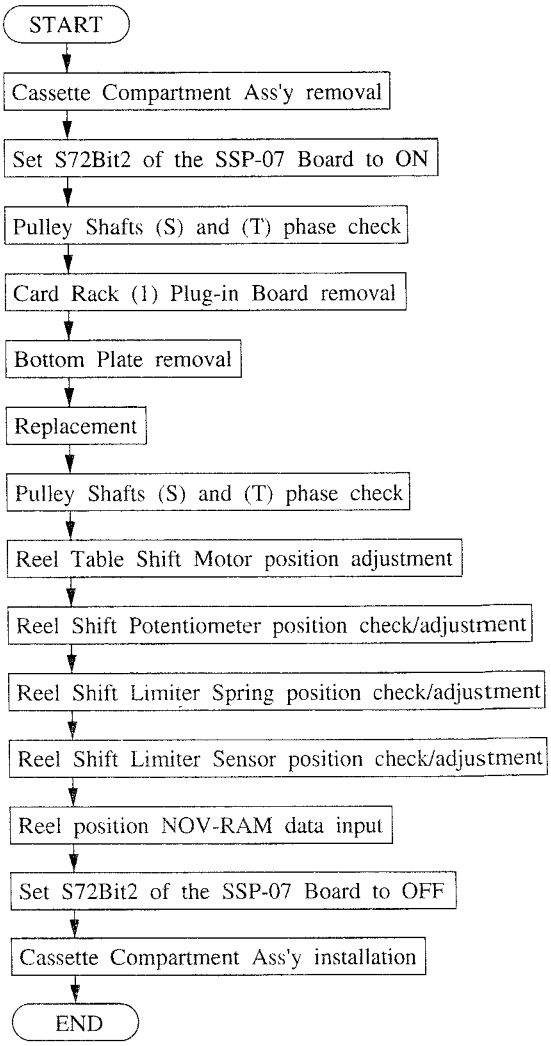
Note: Set the bit to OFF after each adjustment. Otherwise, the device will not operate normally.

6-8-1. Reel Table Shift Motor Ass'y Replacement

Basic Knowledge

A. Prepare the following tools for adjustment after replacement:
- Wire gauge
  Sony Parts No. : J-6152-450-A
- Molyton grease
  Sony Parts No. : 7-662-001-41

B. Replacement flowchart


START
Cassette Compartment Ass'y removal
Set S72Bit2 of the SSP-07 Board to ON
Pulley Shafts (S) and (T) phase check
Card Rack (1) Plug-in Board removal
Bottom Plate removal
Replacement
Pulley Shafts (S) and (T) phase check
Reel Table Shift Motor position adjustment
Reel Shift Potentiometer position check/adjustment
Reel Shift Limiter Spring position check/adjustment
Reel Shift Limiter Sensor position check/adjustment
Reel position NOV-RAM data input
Set S72Bit2 of the SSP-07 Board to OFF
Cassette Compartment Ass'y installation
END

Removal

1. Cassette Compartment Ass'y removal
   Refer to Section 6-5.

2. Set Bit2 of S72 on the SSP-07 Board to ON.
   Refer to Item D of Basic Knowledge of Section. 6-8.

   Note: Set Bit2 of S72 on the SSP-07 Board to OFF after the adjustment.

3. Set the reel position to L, and turn off the power.
   [Reel Shift Test Menu setting method]
   Refer to Item C of Basic Knowledge of Section. 6-8.

4. Pulley Shafts (S) and (T) Phase Check
   Refer to Item B of Section 6-8 Basic Knowledge.

5. Card Rack (1) Plug-in Boards removal
   - Disconnect the following Plug-in Boards of the Card Rack (1): MD-62 Board, SSP-07 Board, PR-157 Board, DE-37 Board, EN-99 Board and AD-73 Board (DVR-P28: AD-90 Board).

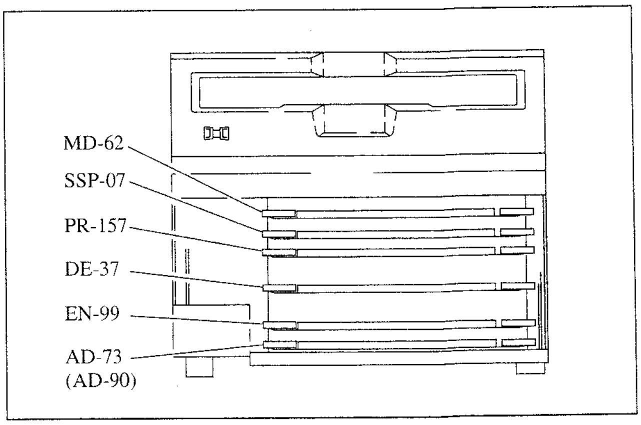


Fig. 6-8-1 Card Rack (1) Plug-in Boards

6. Bottom Plate removal
   (1) Place the device with the power block down.

   Note: Do this work slowly so that no shock is applied to the device.

   (2) Remove the four screws fixing the Bottom Plate, then remove the Bottom Plate.

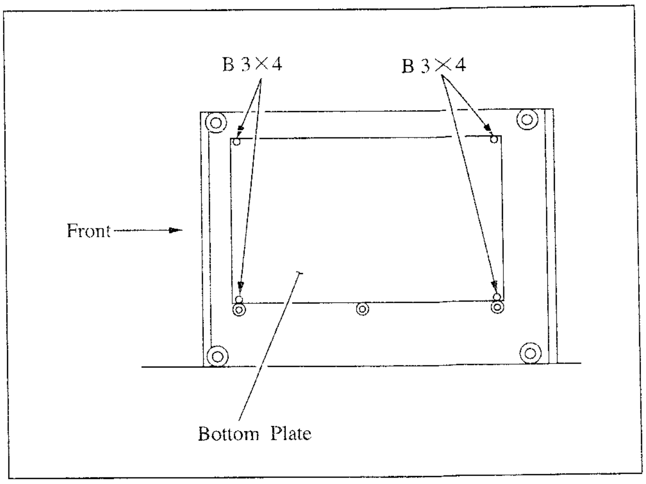


Fig. 6-8-2 Bottom Plate Removal

7. Reel Shift Motor Ass'y removal
   (1) Disconnect connector CN313 from the MT-47 Board shown in Fig. 6-8-3.

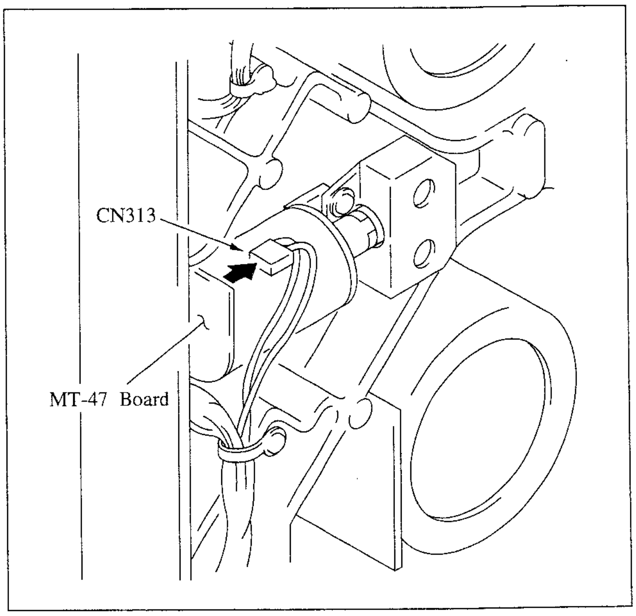

CN313
MT-47 Board

Fig. 6-8-3 Harness Removal

   (2) Remove the screw fixing the WG Cover, then remove the WG Cover. (Fig. 6-8-4)

   (3) Remove the two screws fixing the Reel Shift Motor Ass'y, then remove the Reel Shift Motor Ass'y. (Fig. 6-8-4)

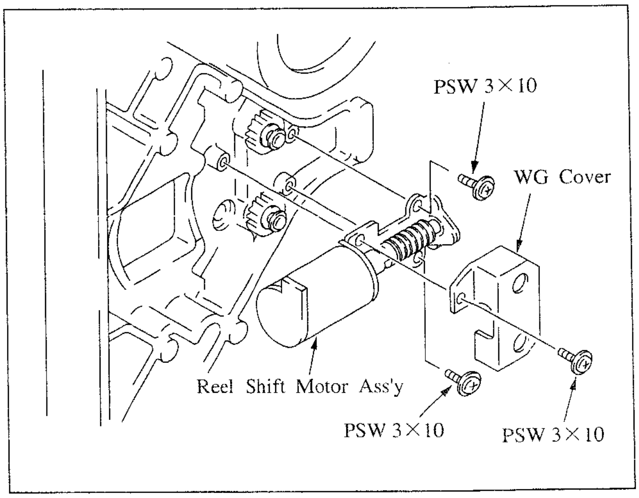

PSW 3×10
WG Cover
Reel Shift Motor Ass'y
PSW 3×10
PSW 3×10

Fig. 6-8-4 Reel Shift Motor Ass'y Removal

8. Component removal
   1. (1) Remove the screws shown in Fig. 6-8-5 and the set screw, and then disassemble the Reel Shift Motor Ass'y as shown in the figure.
   2. (2) Replace components as required and reassemble.

Note: Pay attention to the following when the components of the Reel Shift Motor Ass'y are replaced and assembled:

(i) Be careful about the polarity when the MT-47 board is soldered to the Reel Shift Motor (Fig. 6-8-6).

(ii) Move the Reel Shift Motor in the direction indicated by arrow A shown in Fig. 6-8-7 and tighten it using the two screws when the reel shift motor is installed.

(iii) Smear a slight amount of Molyton grease on the inner surface of the Worm Joint shown in Fig. 6-8-7 when the Worm Joint is replaced.

(iv) Move the Worm Joint in the direction indicated by arrow B in Fig. 6-8-7 and tighten it using the two set screws when the Worm Joint is installed.

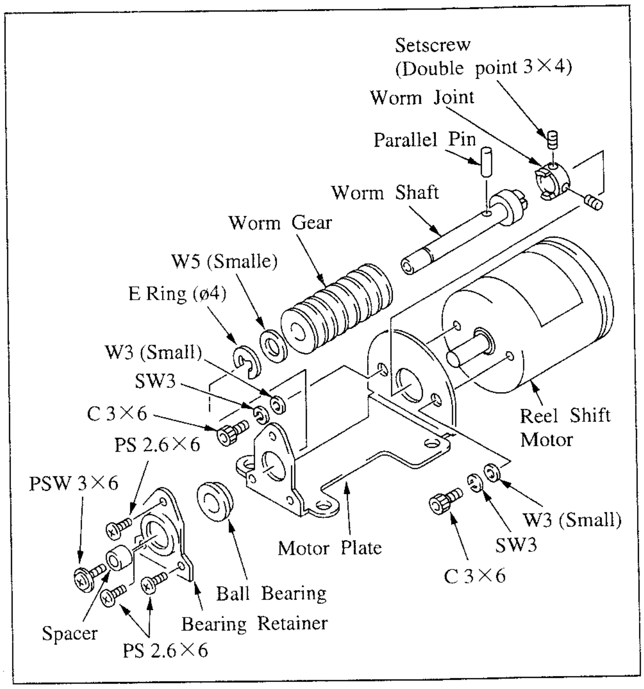

Setscrew
(Double point 3×4)
Worm Joint
Parallel Pin
Worm Shaft
Worm Gear
W5 (Smalle)
E Ring (ø4)
W3 (Small)
SW3
C 3×6
PS 2.6×6
PSW 3×6
Reel Shift Motor
W3 (Small)
SW3
C 3×6
Motor Plate
Ball Bearing
Bearing Retainer
Spacer
PS 2.6×6

Fig. 6-8-5 **Reel Shift Motor Ass'y Components Replacement**

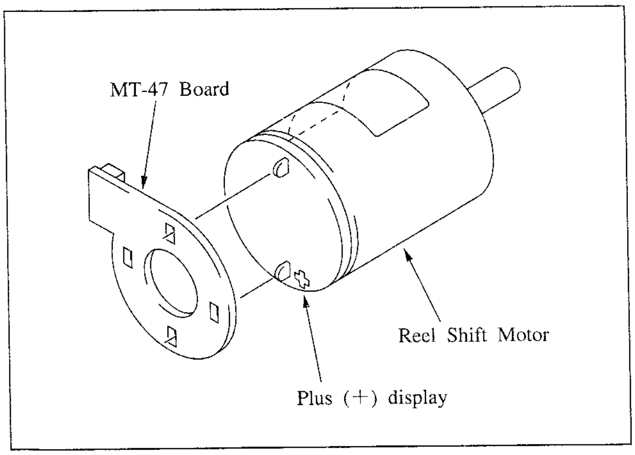

MT-47 Board
Reel Shift Motor
Plus (+) display

Fig. 6-8-6 **MT-47 Board Installation**

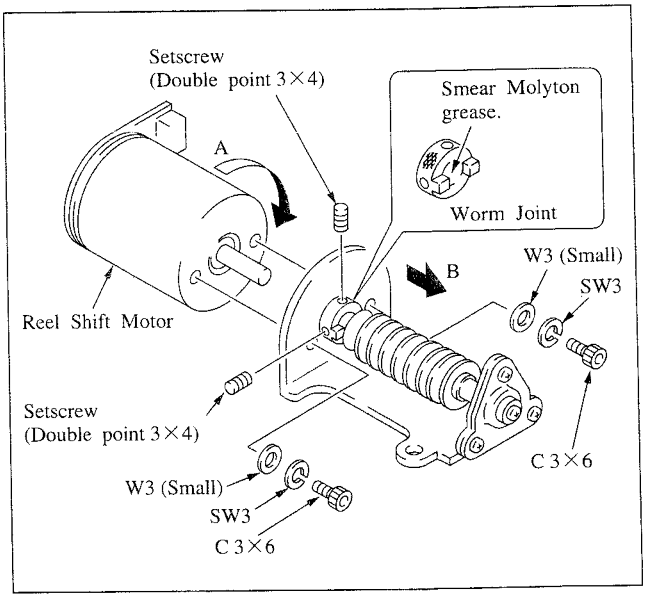

Setscrew
(Double point 3×4)
Smear Molyton grease.
Worm Joint
A
B
W3 (Small)
SW3
Reel Shift Motor
Setscrew
(Double point 3×4)
C 3×6
W3 (Small)
SW3
C 3×6

Fig. 6-8-7 **Reel Shift Motor Installation**

9. Pulley Shafts (S) and (T) Phase Check (Fig. 6-8-8)
   (1) Refer to Item B of Section 6-8 Basic Knowledge.
   (2) If the phase of the Pulley Shaft (S) or (T) is NG, move the Pulley Shaft (S) Ass'y to direction C or move the Pulley Shaft (T) Ass'y to direction D.

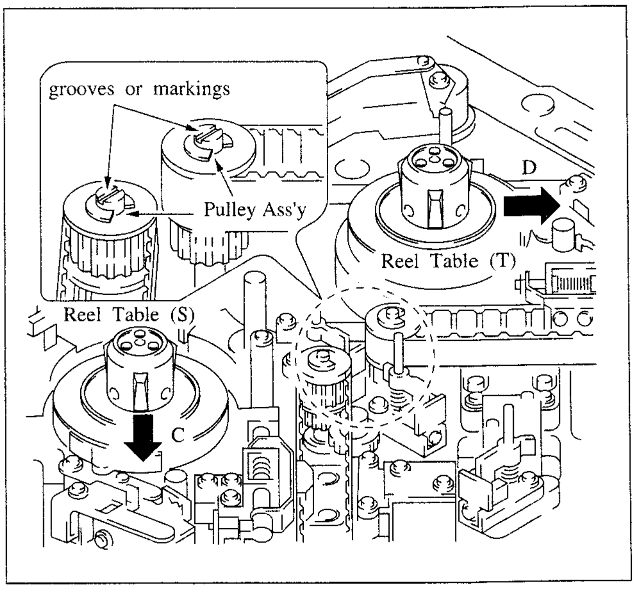

grooves or markings
Pulley Ass'y
D
Reel Table (T)
Reel Table (S)
C

Fig. 6-8-8 Pulley Shafts (S) and (T) Phase Check

10. Reel Shift Motor Ass'y Installation
    (1) Clean the installing surface of the Base plate and Reel Shift Motor Ass'y shown in Fig. 6-8-9 with a cleaning piece moistened with cleaning liquid.
    (2) Tighten the Reel Shift Motor Ass'y onto the Base Plate snugly using the three screws shown in Fig. 6-8-9, but do not tighten completely.

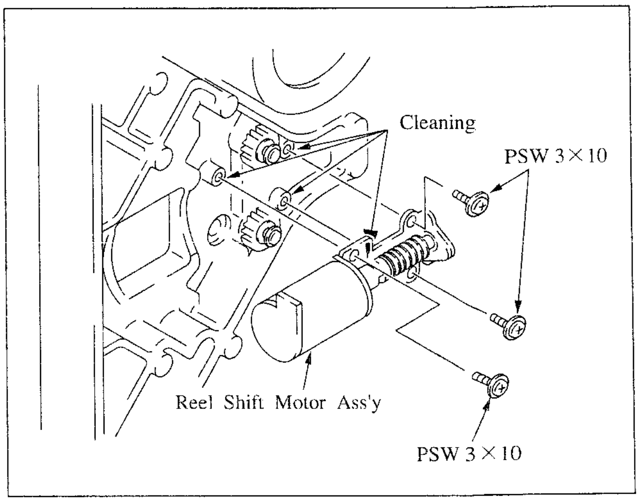

Cleaning
PSW 3×10
Reel Shift Motor Ass'y
PSW 3×10

Fig. 6-8-9 Reel Shift Motor Ass'y Installation

11. Reel Table Shift Motor position adjustment (Fig. 6-8-10)
    (1) Loosen the three screws shown in Fig. 6-8-10 that were temporarily tightened by 1/2 turn.

    (2) Use a wire gauge so that the clearances between the Worm Gear and the right and left Worm Wheels are equal. Then, tighten the three screws.

    (3) Using wire gauges, check that clearances E between the dents of the Worm Gear and the top of the right and left Worm Wheels shown in Fig. 6-8-10 meet the specification below.

        Specification:
        - The ø 0.3 mm wire gauge passes through clearance E.
        - The ø 0.7 mm wire gauge does not pass through clearance E.
          If the specification is not met, repeat steps (1) and later.

    (4) Smear Molyton grease slightly on all the surfaces of the Worm Gear shown in Fig. 6-8-10.

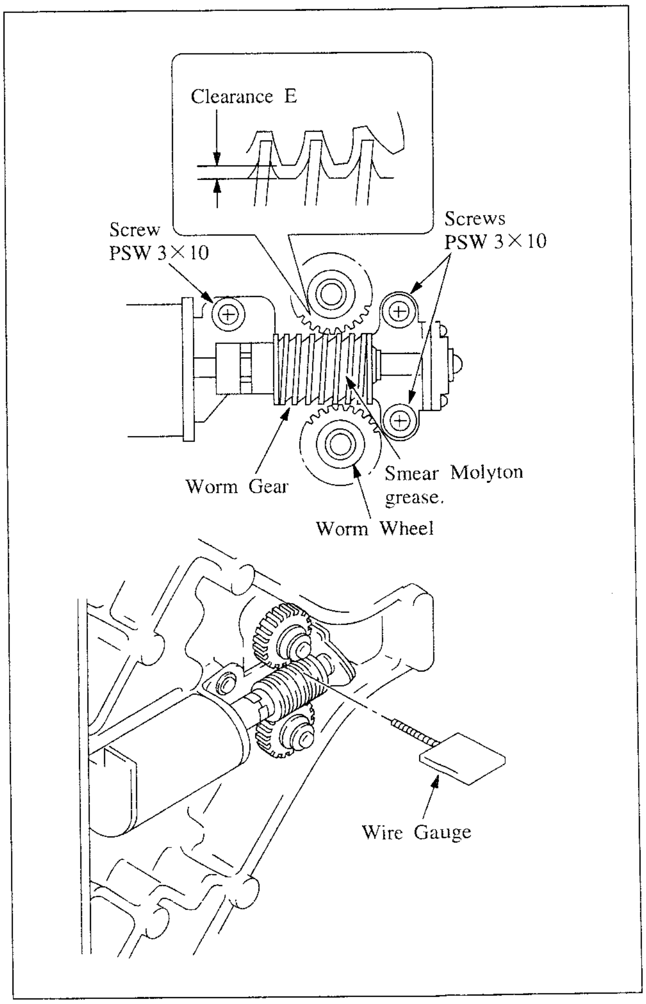

Clearance E
Screw PSW 3×10
Screws PSW 3×10
Worm Gear
Smear Molyton grease.
Worm Wheel
Wire Gauge

Fig. 6-8-10 **Reel Table Shift Motor Ass'y Position Adjustment**

12. WG Cover installation (Fig. 6-8-11)
    (1) Remove the screw shown in Fig. 6-8-11.
        (One of the three screws tightened in step 11.)
    (2) Install the WS Cover on the Reel Shift Motor Ass'y, shifting it in the direction indicated by arrow F. Then tighten it using the screw.
13. Connect connector CN313, which was disconnected in step 7, to the MT-47 Board.
14. Bottom Plate installation
    Install the Bottom Plate in the reverse order of step 6.
15. Card rack (1) Plug-in Boards installation
    Connect the Card Rack (1) Plug-in Boards in the reverse order of step 5.
16. Reel Shift Potentiometer position check/adjustment
    Refer to step 15 of Section 6-8-5 (1).
17. Reel Shift Limiter Spring position check/adjustment
    Refer to step 9 of Section 6-7-4.
18. Reel Shift Limiter Sensor position check/adjustment
    Refer to step 10 of Section 6-7-4.
19. Reel position NOV-RAM data input
    Refer to step 11 of Section 6-7-4.
20. Set Bit2 of S72 on the SSP-07 Board to OFF.
21. Cassette Compartment Ass'y installation
    Refer to Section 6-5.

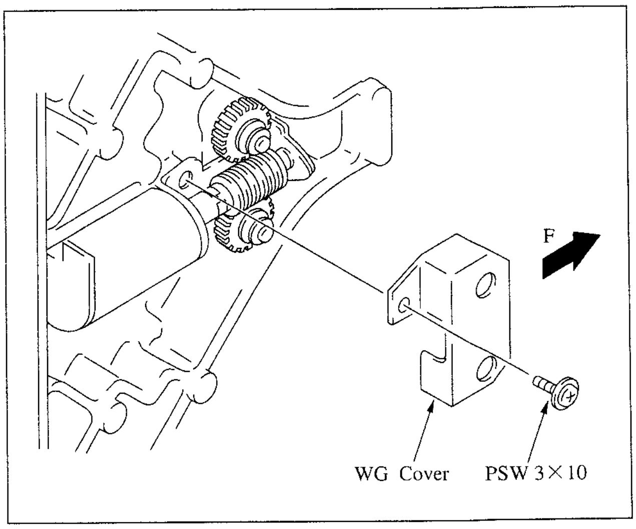


Fig. 6-8-11 WG Cover Installation

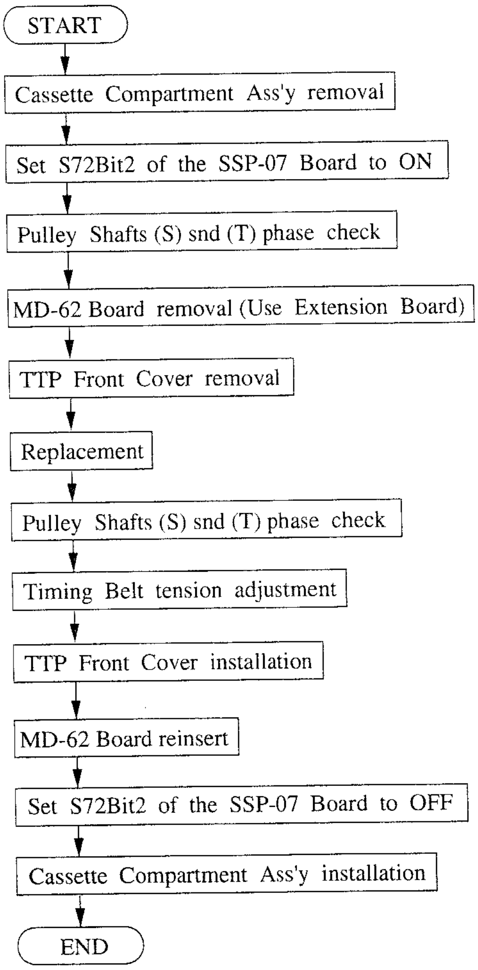
6-8-2. Sub-Pulley Ass'y Replacement (at Timing Belt Driven Side)

Basic Knowledge

A. The Sub-Pulley Ass'y is used to control the timing belt running position and tension.

B. Prepare the following tools for adjustment after replacement:
- Molyton grease (No. 320)
  Sony Parts No.: 7-662-001-41
- Tension scale (5 kg)
  Sony Parts No.: J-6041-640-A
- Tension Measuring Tool
  (String or wire rope that is fit for 6 kg forces.)

C. Replacement flowchart


START
Cassette Compartment Ass'y removal
Set S72Bit2 of the SSP-07 Board to ON
Pulley Shafts (S) snd (T) phase check
MD-62 Board removal (Use Extension Board)
TTP Front Cover removal
Replacement
Pulley Shafts (S) snd (T) phase check
Timing Belt tension adjustment
TTP Front Cover installation
MD-62 Board reinsert
Set S72Bit2 of the SSP-07 Board to OFF
Cassette Compartment Ass'y installation
END

Removal

1. Cassette Compartment Ass'y removal
   Refer to Section 6-5.

2. Set Bit2 of S72 on the SSP-07 Board to ON.
   Refer to Item D of Basic Knowledge of Section 6-8.

   Note: Set Bit2 of S72 on the SSP-07 Board to OFF after the adjustment.

   Remove the MD-62 Board (plug-in Board) of the Card Rack (1), and extend it with the EX-138 Extension Board. Reinsert it to the unit.
   [Extension Board use method]
   Refer to Section 1-6.

3. Set the reel position to L, and turn off the power.
   [Reel Shift Test Menu setting method.]
   Refer to Item C of Basic Knowledge of Section. 6-8.

4. Pulley Shafts (S) and (T) Phase Check
   Refer to Item B of Section 6-8 Basic Knowledge.

5. TTP Front Cover removal (Fig. 6-8-12)
   - Remove the two screws fixing the TTP Front Cover, then remove the TTP Front Cover.

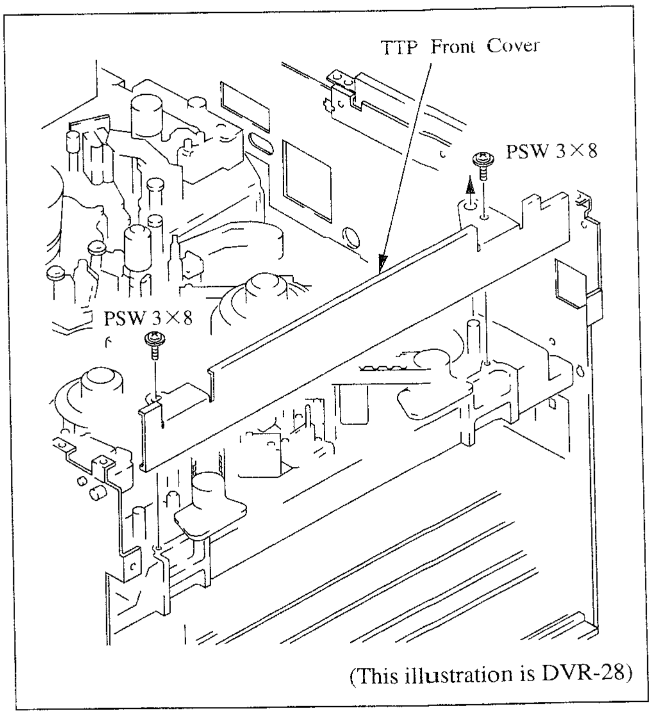

TTP Front Cover
PSW 3×8
PSW 3×8
(This illustration is DVR-28)

Fig. 6-8-12 TTP Front Cover Removal

6. Sub-Pulley Ass'y removal (Fig. 6-8-13)
   Remove the two screws fixing the Sub-Pulley Ass'y, and then remove the Sub-Pulley Ass'y.

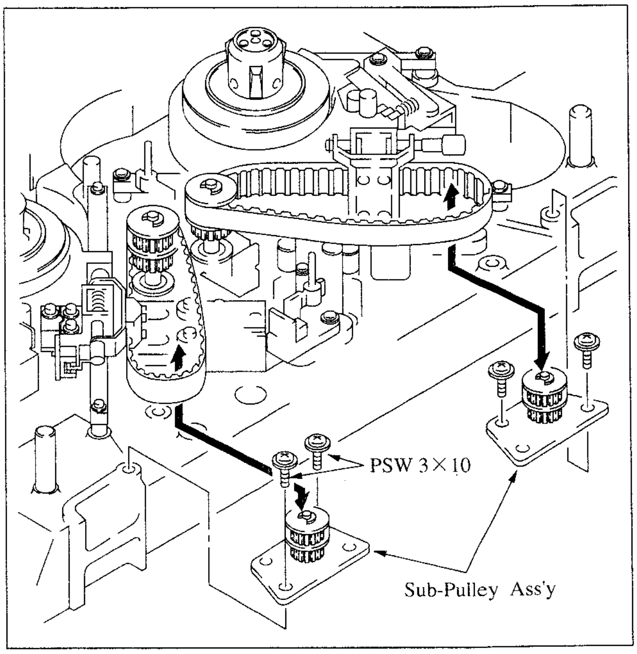

PSW 3×10
Sub-Pulley Ass'y

Fig. 6-8-13 Sub-Pulley Ass'y Removal

7. Components replacement
   (1) Remove the E ring shown in Fig. 6-8-14 and disassemble the Sub-Pulley Ass'y as shown in the figure.

   (2) Replace components as required and reassemble.

   Note: Pay attention to the following when the Sub-Pulley Ass'y is assembled:
   1. Clean the installing surface of each component with a cleaning piece moistened with cleaning liquid.
   2. Smear a slight amount of Molyton grease on the outer circumference surface of the Sub-Pulley Shaft shown in the figure.

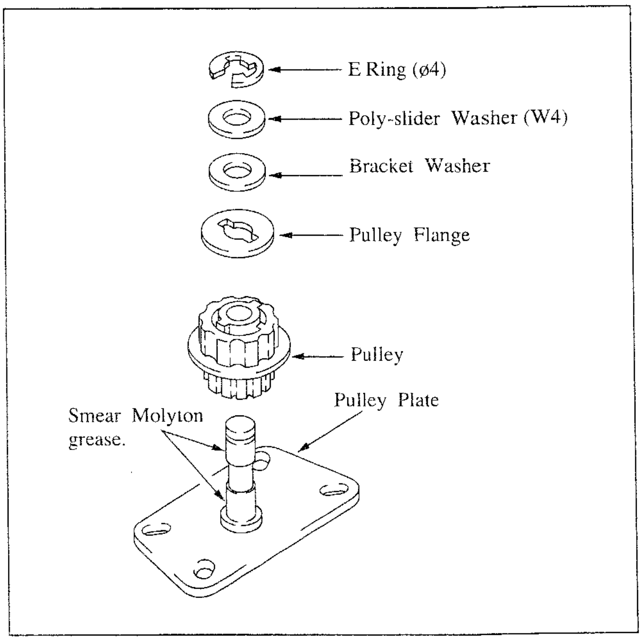

E Ring (ø4)
Poly-slider Washer (W4)
Bracket Washer
Pulley Flange
Pulley
Pulley Plate
Smear Molyton grease.

Fig. 6-8-14 Sub-Pulley Ass'y Components Replacement

8. Pulley Shafts (S) and (T) Phase Check (Fig. 6-8-15)
   (1) Refer to Item B of Section 6-8 Basic Knowledge.

   (2) If the phase of the Pulley Shaft (S) or (T) is NG, move the Pulley Shaft (S) Ass'y to direction C or move the Pulley Shaft (T) Ass'y to direction D.

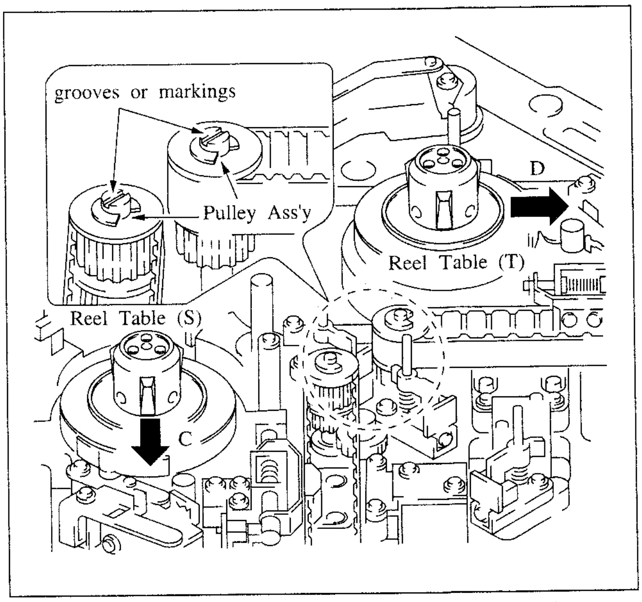

grooves or markings
Pulley Ass'y
D
Reel Table (T)
Reel Table (S)
C

Fig. 6-8-15 Pulley Shafts (S) and (T) Phase Check

9. Sub-Pulley Ass'y installation
   (1) Clean the installing surfaces of the Base Plate and Sub-Pulley Ass'y shown in Fig. 6-8-16 with a cleaning piece moistened with cleaning liquid.

   (2) Put the Timing Belt on the Sub-pulley. Then tighten the Sub-Pulley Ass'y snugly onto the Base Plate using the two screws, but do not tighten completely (Fig. 6-8-13).

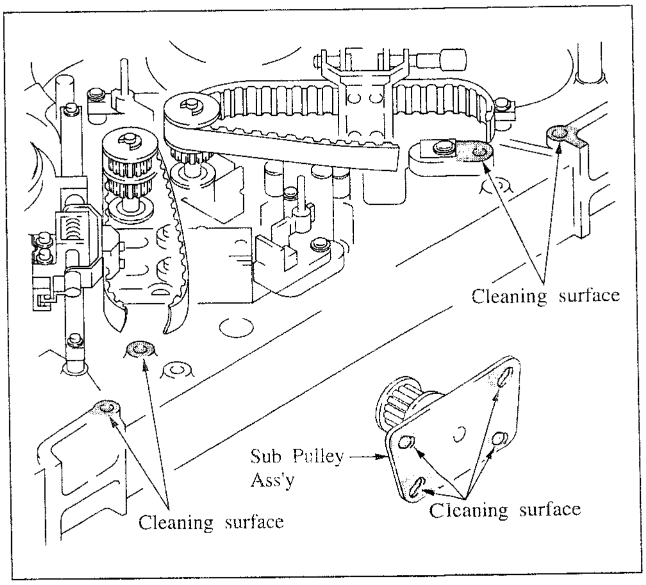

Cleaning surface
Sub Pulley Ass'y
Cleaning surface
Cleaning surface

Fig. 6-8-16 Installing Surface Cleaning

10. Timing Belt tension adjustment
    Refer to step 8 of Section 6-7-4.

11. Turn the unit on and set the Reel Shift Test Menu.
    [Reel Shift Test Menu setting method]
    Refer to Item C of Basic Knowledge of Section 6-8.

12. Operate the cursor keys to shift the reel position. Be sure to perform this movement smoothly.

13. Turn the unit off.

14. TTP Front Cover installation
    Install the TTP Front Cover in the reverse order of step 5.

15. Remove the MD-62 Board and EX-185 Extension Board.
    Reinstall only the MD-62 Board.

16. Set Bit2 of S72 on the SSP-07 Board to OFF.

17. Cassette Compartment Ass'y installation
    Refer to Section 6-5.

6-8-3. Pulley Ass'y Replacement (at Timing Belt Driving Side)

Basic Knowledge

A. The Pulley Ass'y is used to transfer the driving force from the Reel Shift Motor to the Timing Belt. The Pulley Ass'y consists of the three blocks described below. This section describes the replacement procedure. Follow the corresponding procedure when only the Pulley Ass'y or Worm Wheel Ass'y is replaced.

Worm Wheel Ass'y:
The Worm Wheel Ass'y transfers the driving force from the Shift Motor to the pulley through the Worm Wheel.

Note: Steps 11 through 14 are not required when only this Worm Wheel Ass'y is to be replaced.

Pulley Ass'y:
The Pulley Ass'y transfers the driving force at the Worm Wheel to the Timing Belt through the pulley.

Note: Steps 6 through 10 and 13 are not required when only this Pulley Ass'y is to be replaced.

Bearing Ass'y:
The Bearing Ass'y is a bearing block for the Worm Wheel Ass'y and Pulley Ass'y.

B. Prepare the following tools for adjustment after replacement:
- Tension Scale (5 kg)
  Sony Parts No.: J-6041-640-A
- Tension Measuring Tool
  (String or wire rope that is fit for 6 kg forces.)

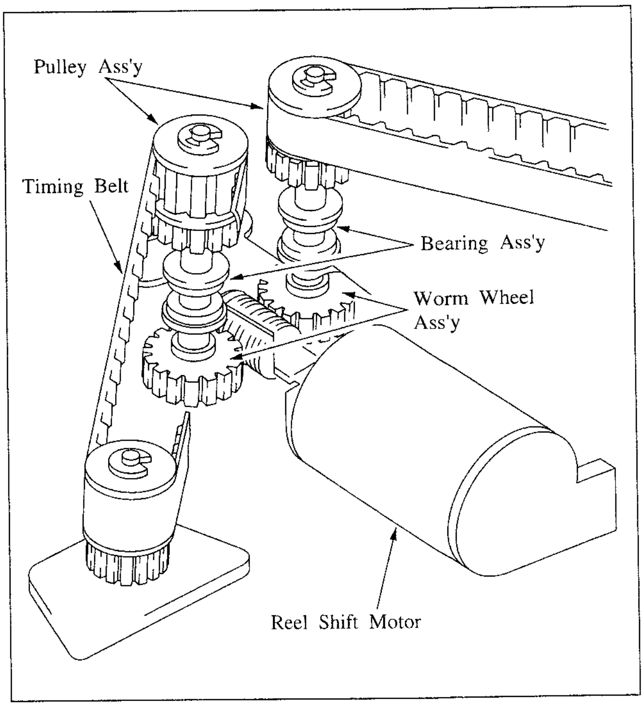
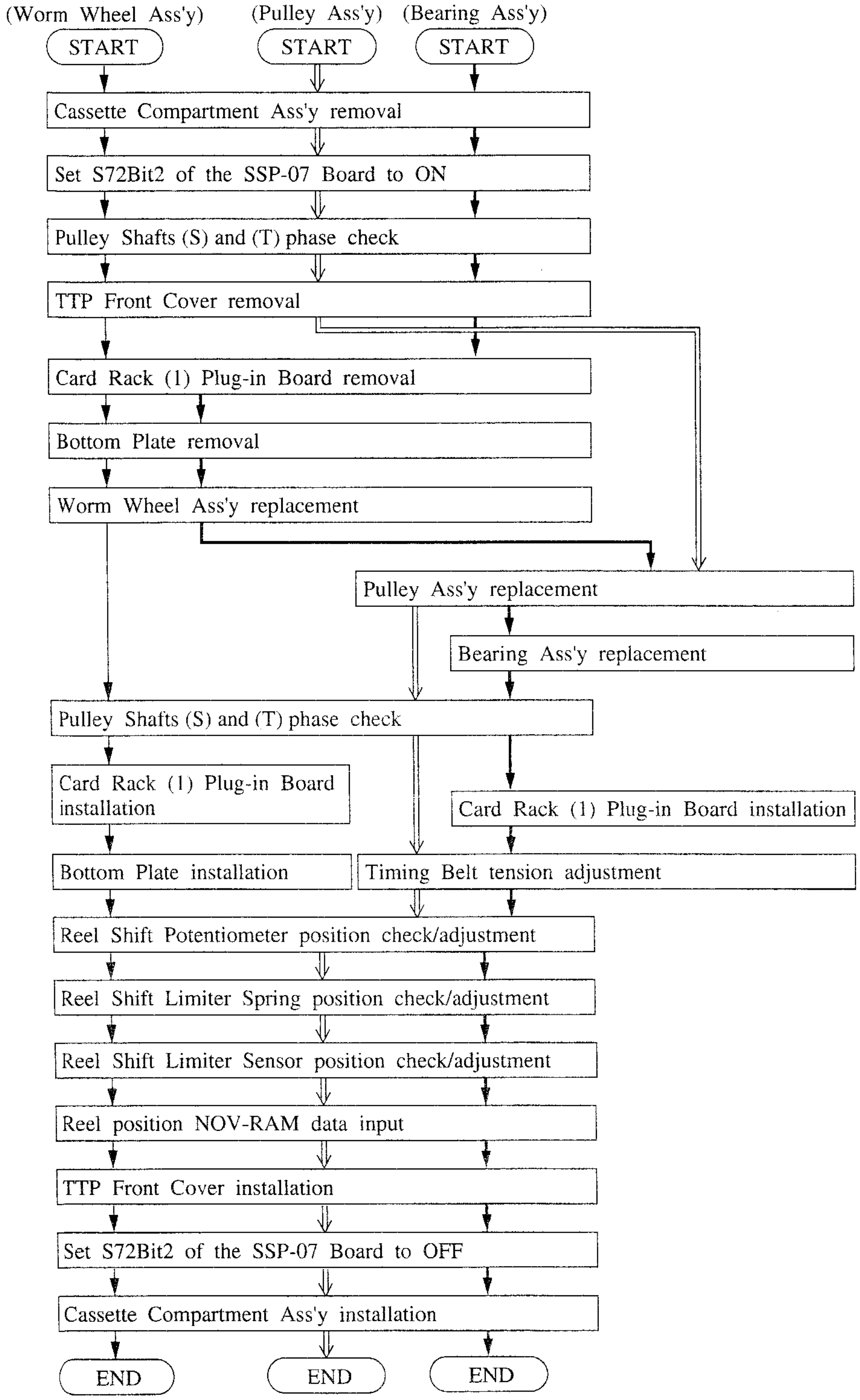


Fig. 6-8-17 Pulley Ass'y Components

C. Replacement flowchart


(Worm Wheel Ass'y)
(Pulley Ass'y)
(Bearing Ass'y)
START
START
START
Cassette Compartment Ass'y removal
Set S72Bit2 of the SSP-07 Board to ON
Pulley Shafts (S) and (T) phase check
TTP Front Cover removal
Card Rack (1) Plug-in Board removal
Bottom Plate removal
Worm Wheel Ass'y replacement
Pulley Ass'y replacement
Bearing Ass'y replacement
Pulley Shafts (S) and (T) phase check
Card Rack (1) Plug-in Board installation
Card Rack (1) Plug-in Board installation
Bottom Plate installation
Timing Belt tension adjustment
Reel Shift Potentiometer position check/adjustment
Reel Shift Limiter Spring position check/adjustment
Reel Shift Limiter Sensor position check/adjustment
Reel position NOV-RAM data input
TTP Front Cover installation
Set S72Bit2 of the SSP-07 Board to OFF
Cassette Compartment Ass'y installation
END
END
END

Removal

1. Cassette Compartment Ass'y removal
   Refer to Section 6-5.

2. Set Bit2 of S72 on the SSP-07 Board to ON.
   Refer to Item D of Basic Knowledge of Section 6-8.

   Note: Set Bit2 of S72 on the SSP-07 Board to OFF after the adjustment.

3. Set the reel position to L, and turn off the power.
   [Reel Shift Test Menu setting method]
   Refer to Item C of Basic Knowledge of Section 6-8.

4. Pulley Shafts (S) and (T) Phase Check
   Refer to Item B of Section 6-8 Basic Knowledge.

5. TTP front cover removal
   - Remove the two screws fixing the TTP Front Cover, and then remove the TTP Front Cover.

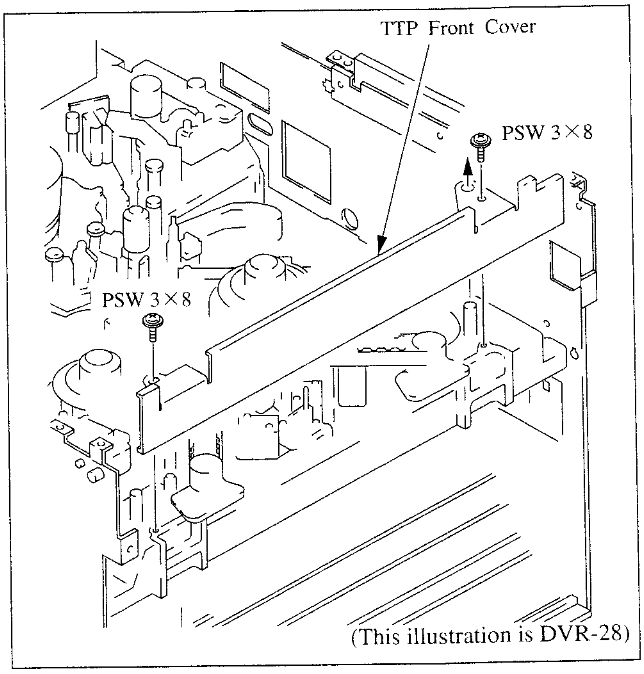


Fig. 6-8-18 TTP Front Cover Removal

6. Card Rack (1) Plug-in Boards removal
   - Disconnect the following Card Rack (1) Plug-in Boards: MD-62 Board, SSP-07 Board, PR-157 Board, DE-37 Board, EN-99 Board and AD-73 Board (DVR-P28: AD-90 Board).

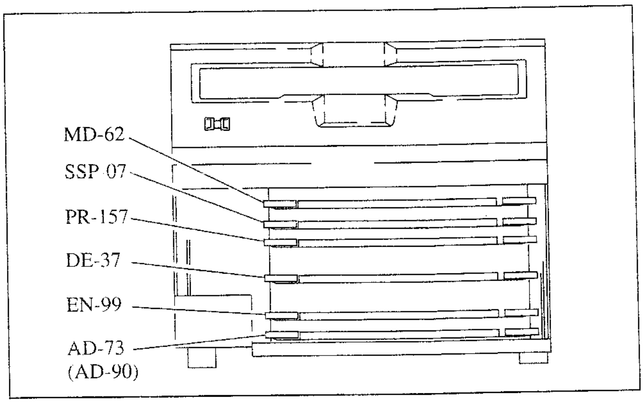


Fig. 6-8-19 Card Rack (1) Plug-in Boards

7. Bottom Plate removal
   (1) Place the device with the power block down.

   Note: Perform this work slowly so that no shock is applied to the device.

   (2) Remove the four screws fixing the Bottom Plate, and then remove the Bottom Plate.

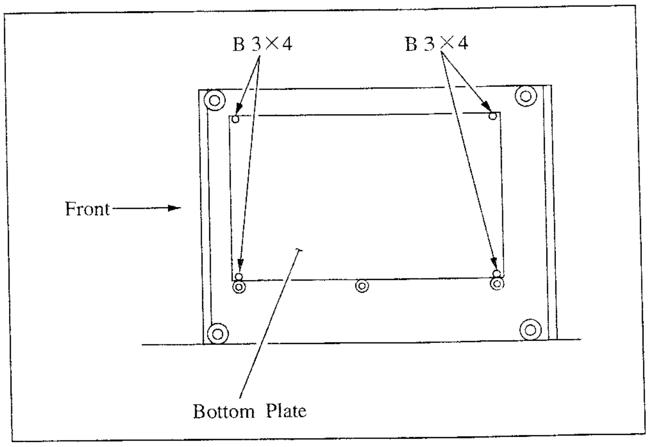


Fig. 6-8-20 Bottom Plate Removal

8. Pulley Shafts (S) and (T) Phase Check (Fig. 6-8-21)
   (1) Refer to Item B of Section 6-8 Basic Knowledge.

   (2) If the phase of the Pulley Shaft (S) or (T) is NG, move the Reel Table (S) Ass'y to direction of A or move the Reel Table (T) Ass'y to direction of B.
   (When the Reel Tables move to direction A or B, turn the Worm Gear using a finger.)

9. Worm Wheel Ass'y replecement/installation
   (1) Remove the screw fixing the WG Cover, and then remove the WG Cover. (Fig. 6-8-22)

   (2) Remove the screws (or *3 E rings) which secure the Worm Wheel and take the Worm Wheel to pices as shown in Fig. 6-8-23 or Fig. 6-8-23 (a).

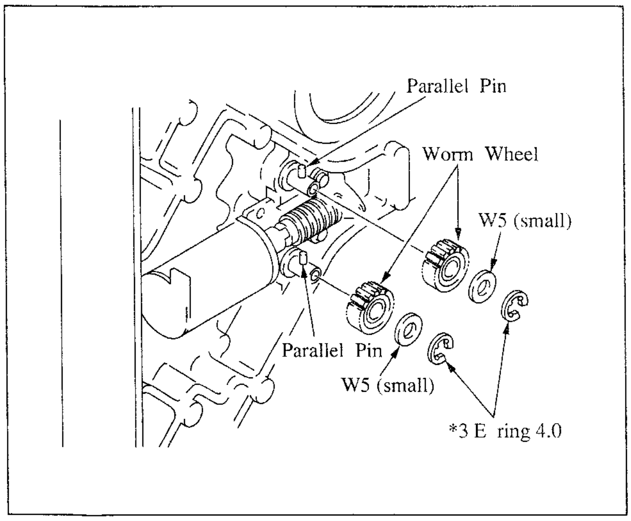
   Note: Perform step 13 and the subsequent steps to replace the Bearing Ass'y.

10. Worm Wheel Ass'y replacement/installation
    (1) Replace the parts as required and assemble the Worm Wheel.
    *1: After assembling, pull out the Pulley (S) and (T) Assemblies in direction of arrow C. Check that the Pulley (S) and (T) Assemblies put back self-power where they were.

    (2) Install the WG Cover.

    (3) Reverse the procedure in steps 6 and 7 to mount the following components:
    - Plug-in Boards of the Card Rack (1)
    - Bottom Plate

    * Perform step 15 and the subsequent steps.


Parallel Pin
Worm Wheel
W5 (small)
Parallel Pin
W5 (small)
*3 E ring 4.0

*3 **Fig. 6-8-23 (a) Worm Wheel Ass'y Replacement**

Applicable Serial Numbers

*3: DVR-28 (UC) S/N 12101 and higher
DVR-28P (UC) S/N 11201 and higher
DVR-28P (EK) S/N 11701 and higher

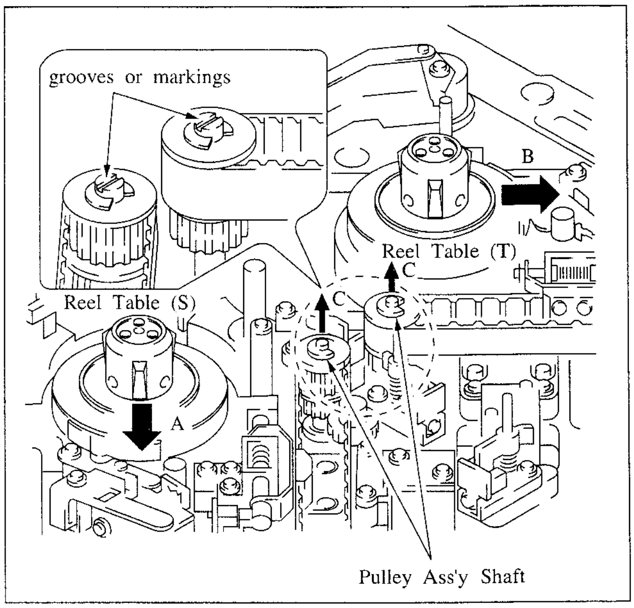

grooves or markings
B
Reel Table (T)
C
C
Reel Table (S)
A
Pulley Ass'y Shaft

Fig. 6-8-21 Pulley Shafts (S) and (T) Phase Check

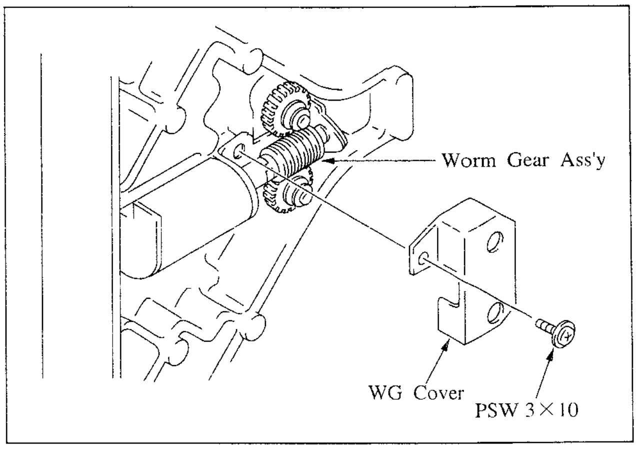

Worm Gear Ass'y
WG Cover
PSW 3×10

Fig. 6-8-22 WG Cover Removal

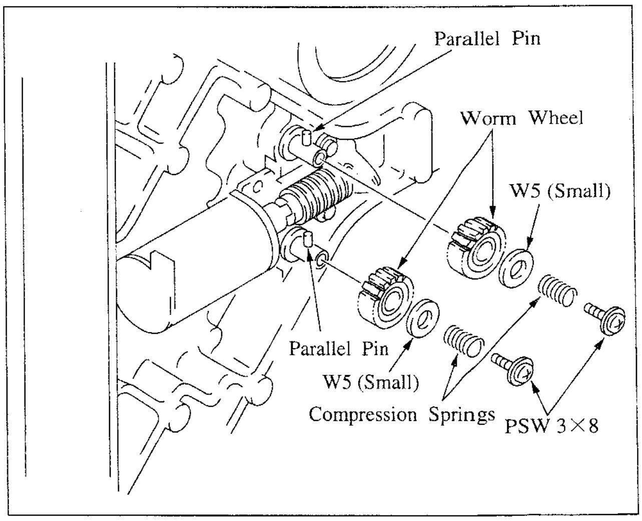

Parallel Pin
Worm Wheel
W5 (Small)
Parallel Pin
W5 (Small)
Compression Springs
PSW 3×8

Fig. 6-8-23 Worm Wheel Ass'y Replacement

11. Pulley Ass'y replacement
    (1) Remove the two screws fixing the Sub-Pulley Ass'y. Then remove the Sub-Pulley Ass'y.

    (2) Remove the Timing Belt from the Pulley Ass'y.

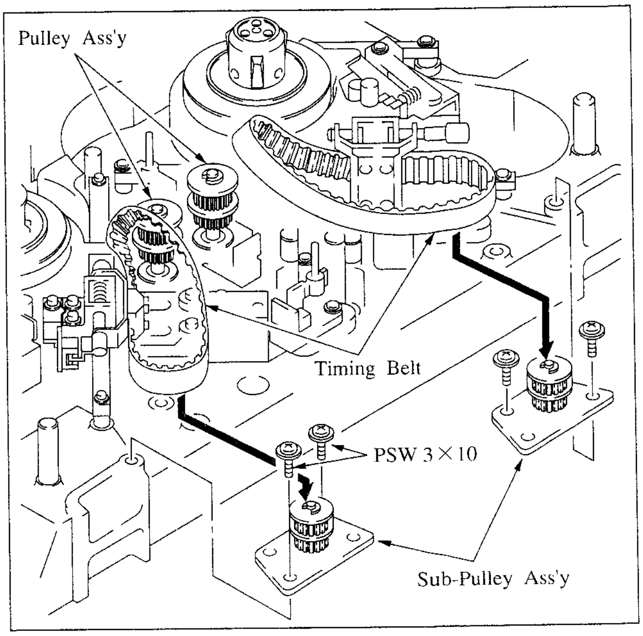

Pulley Ass'y
Timing Belt
PSW 3×10
Sub-Pulley Ass'y

Fig. 6-8-24 Timing Belt Removal

    (3) Remove the E ring and disassemble the Pulley Ass'y as shown in Fig. 6-8-25.

Note: Perform step 13 and the subsequent steps when the Bearing Ass'y is replaced.

12. Pulley Ass'y replacement/installation (Fig. 6-8-25)
    (1) Replace components as required and reassemble.

    (2) Move the Reel Table (S) Ass'y and Reel Table (T) Ass'y in the directions indicated by arrows A and B. Set the grooves of the Pulley Shaft in the direction shown in the figure and put the Timing Belt on the Pulley Ass'y.

    (3) Put the Timing Belt on the Sub-Pulley Ass'y. Tighten the Sub-Pulley Ass'y snugly onto the Base Plate using the two screws, but do not tighten it completely.
    * Perform step 15 and the subsequent steps.

Applicable Serial Numbers

*3:	DVR-28 (UC)	S/N	12101 and higher
	DVR-28P (UC)	S/N	11201 and higher
	DVR-28P (EK)	S/N	11701 and higher

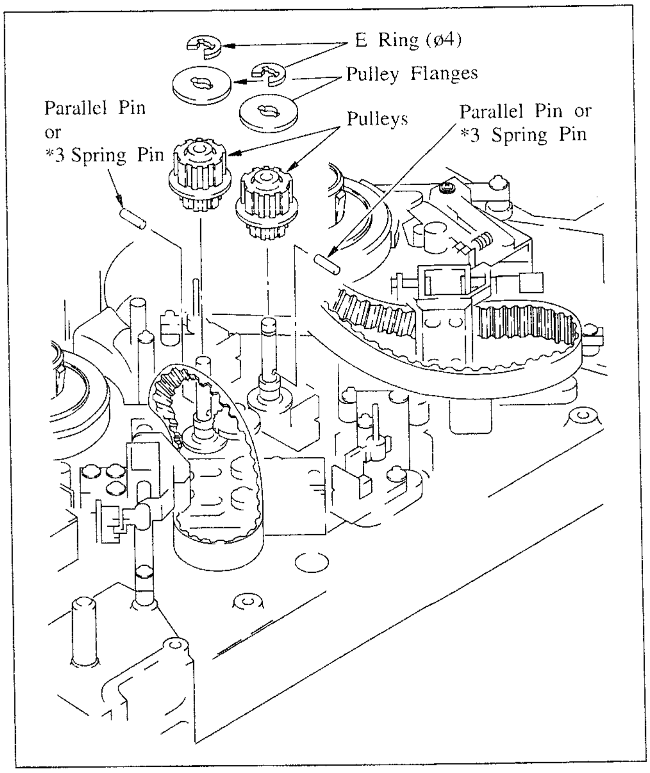

E Ring (ø4)
Pulley Flanges
Parallel Pin
or
*3 Spring Pin
Pulleys
Parallel Pin or
*3 Spring Pin

Fig. 6-8-25 Pulley Ass'y Replacement

13. Bearing Ass'y replacement
    (1) Pull out the Parallel Pin shown in Fig. 6-8-23, and pull out the Pulley Shafts upwards and disassemble the Bearing Ass'y as shown in Fig. 6-8-26.

    (2) Replace components as required and reassemble them.

    Note: 1. Clean the following with a cleaning piece moistened with cleaning liquid when the Bearing Ass'y is assembled:
    - Outer circumference surface of the Pulley Shaft
    - Inner circumference surface of ball bearings
    - Ball bearing installing surface of the Base Plate

    2. When mounting the Pulley Shaft, ensure the direction of the groove in the Pulley Shaft.

    (3) Perform steps 8 and 12.

14. Timing Belt tension adjustment
    Refer to Section 6-7-4, step 8.

15. Reel Shift Potentiometer position check/adjustment
    Refer to Section 6-8-5 (1), step 14.

16. Reel Shift Limiter Spring position check/adjustment
    Refer to Section 6-7-4, step 9.

17. Reel Shift Limiter Sensor position check/adjustment
    Refer to Section 6-7-4, step 10.

18. Reel position NOV-RAM data input
    Refer to Section 6-7-4, step 11.

19. TTP Front Cover installation
    - Reverse the procedure in step 5 to install the TTP Front Cover.

20. Set Bit2 of S72 on the SSP-07 Board to OFF.

21. Cassette Compartment Ass'y installation
    - Refer to Section 6-5.

Applicable Serial Numbers

*3: DVR-28 (UC) S/N 12101 and higher
DVR-28P (UC) S/N 11201 and higher
DVR-28P (EK) S/N 11701 and higher

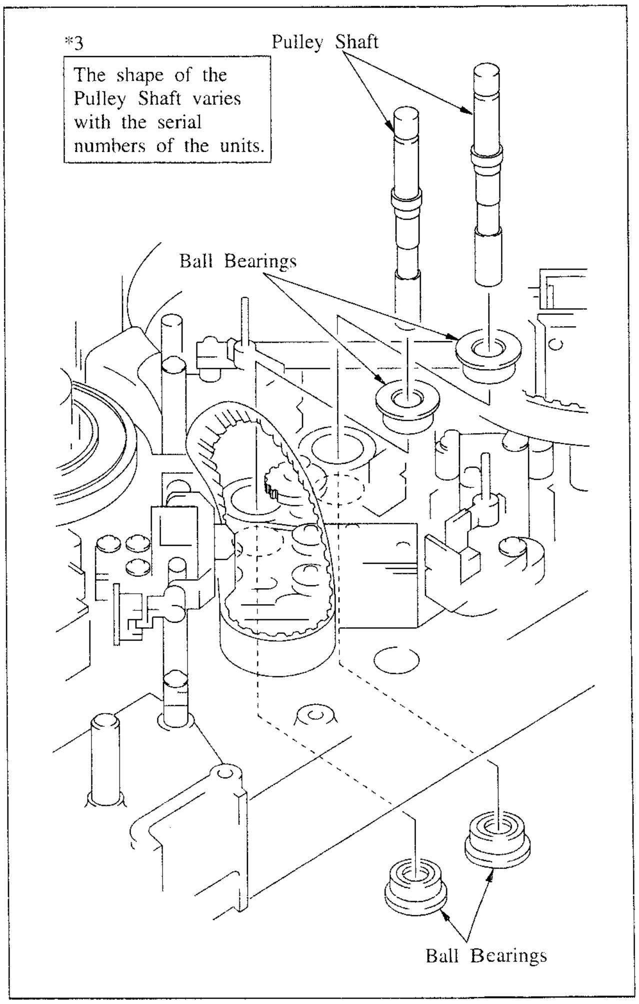

*3
The shape of the Pulley Shaft varies with the serial numbers of the units.
Pulley Shaft
Ball Bearings
Ball Bearings

Fig. 6-8-26 Bearing Ass'y Replacement

6-8-4. Reel Table M Stopper Ass'y Replacement

Basic Knowledge

A. The M Stopper Ass'y is used to set the Reel Table to the M cassette position. The M Stopper Ass'y consists of the Stopper Pin (M), Bearing Ass'y (Stopper Pin holder), and Plunger Solenoid (for Stopper Pin driving).
   *3: If the unit is applicable to the following Serial Numbers, replace the block of the M Stopper Ass'y as shown in Fig. 6-8.

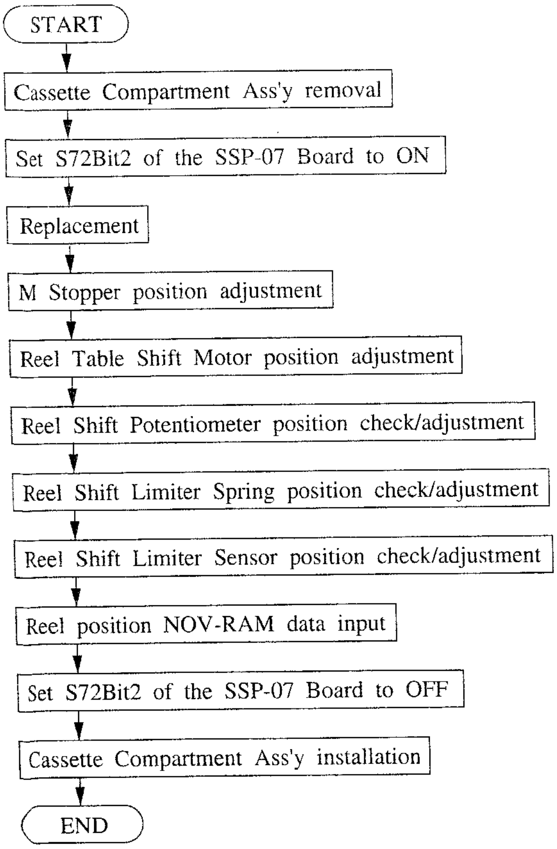
   Applicable Serial Numbers

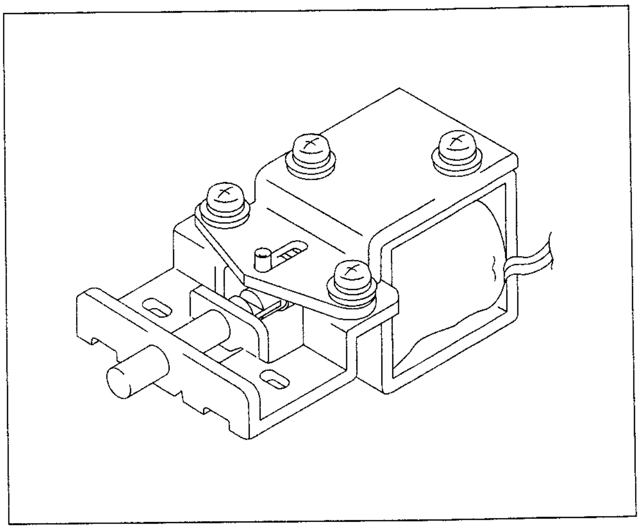
*3:	DVR-28 (UC)	S/N	12101 and higher
	DVR-28P (UC)	S/N	11201 and higher
	DVR-28P (EK)	S/N	11701 and higher

B. The M Stopper Ass'y is used for both the Supply and Take-up sides.
   The M Stopper Ass'y on both sides can be replaced and adjusted using the same procedure.

C. Prepare the following tools for adjustment after replacement:
   - Molyton grease
     Sony Parts No.: 7-662-001-41
   - Reference plate (28)
     Sony Parts No.: J-6257-390-A
   - Thickness gauge
     Sony Parts No.: J-6041-670-A

D. Replacement flowchart


START
Cassette Compartment Ass'y removal
Set S72Bit2 of the SSP-07 Board to ON
Replacement
M Stopper position adjustment
Reel Table Shift Motor position adjustment
Reel Shift Potentiometer position check/adjustment
Reel Shift Limiter Spring position check/adjustment
Reel Shift Limiter Sensor position check/adjustment
Reel position NOV-RAM data input
Set S72Bit2 of the SSP-07 Board to OFF
Cassette Compartment Ass'y installation
END



*3 **Fig. 6-8 M Stopper Ass'y**

Removal

1. Cassette Compartment Ass'y removal
   Refer to Section 6-5.

2. Set Bit2 of S72 of the SSP-07 Board to ON.

   Note: Be sure to set Bit2 of S72 of the SSP-07 Board to OFF after the adjustment.

3. Set the reel position to S, and turn off the power.
   [Reel Shift Test Menu setting method]
   Refer to Item C of Basic Knowledge of Section. 6-8.

4. M Stopper Ass'y removal
   (1) Disconnect connector CN374 at supply side (CN375 at take-up side) on the SE-122 Board shown in Fig. 6-8-27.

   (2) Remove harness CN374 at the supply side (harness CN375 at the take-up side) from the harness clamps (Fig. 6-8-27).

   (3) Remove the two screws fixing the M Stopper Ass'y, then remove the M Stopper Ass'y.

Applicable Serial Numbers

*3:	DVR-28 (UC)	S/N	12101 and higher
	DVR-28P (UC)	S/N	11201 and higher
	DVR-28P (EK)	S/N	11701 and higher

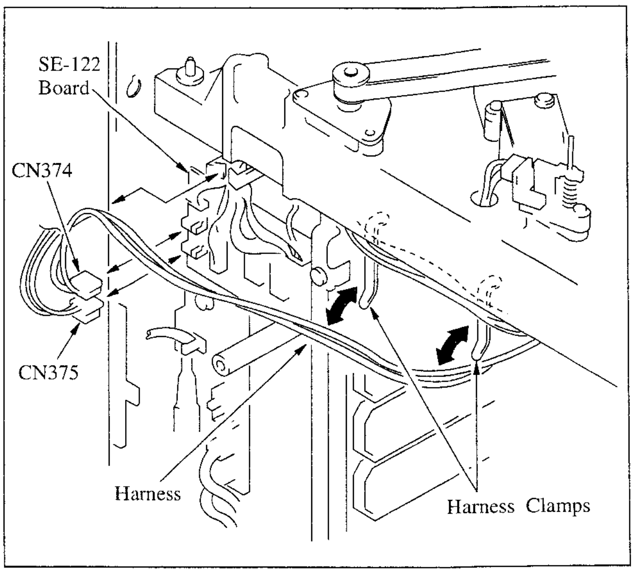

SE-122
Board
CN374
CN375
Harness
Harness Clamps

Fig. 6-8-27 Harness Removal

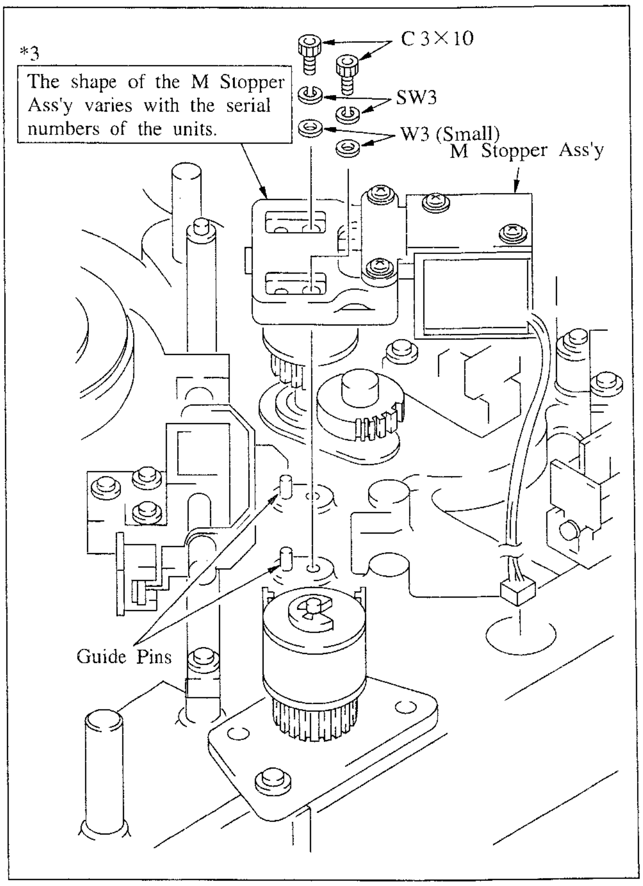

*3
The shape of the M Stopper Ass'y varies with the serial numbers of the units.
C 3×10
SW3
W3 (Small)
M Stopper Ass'y
Guide Pins

Fig. 6-8-28 M Stopper Ass'y Removal

5. M Stopper Ass'y replacement/installation
   *3: If the unit is applicable to the following Serial Numbers, replace the block of the M Stopper Ass'y.

   Applicable Serial Numbers

   *3: DVR-28 (UC) S/N 12101 and higher
   DVR-28P (UC) S/N 11201 and higher
   DVR-28P (EK) S/N 11701 and higher

   (1) Remove the screws and disassemble the M Stopper Ass'y as shown in Fig. 6-8-29.

   (2) Replace components as required and reassemble.

   Notes: Pay attention to the following when the M Stopper Ass'y is assembled:
   1. Clean the installing surface of each component with a cleaning piece moistened with cleaning liquid.
   2. Smear a slight amount of Molyton grease on the outer circumference surface of the Stopper Pin (M) shown in the figure.
   3. Check that the Stopper Pin (M) moves smoothly after assembling.

   (3) Align the guide holes of the M Stopper Ass'y with the guide pins of the Base Plate and tighten two screws snugly, but do not tighten completely.
   (Refer to Fig. 6-8-28.)

   Note: Clean each installing surface with a cleaning piece moistened with cleaning liquid when the M Stopper Ass'y is installed in the Base Plate.

   (4) Connect connector CN374 at the supply side (CN375 at the take-up side) into the SE-122 Board.
   (Refer to Fig. 6-8-27.)

   (5) Fix harness CN374 at the supply side (harness CN375 at the take-up side) using harness clamps.
   (Refer to Fig. 6-8-27.)

6. M Stopper position adjustment
   Refer to Section 6-7-6, step 12.

7. Reel Shift Potentiometer position check/adjustment
   Refer to Section 6-8-5 (1), step 14.

8. Reel Shift Limiter Spring position check/adjustment
   Refer to Section 6-7-4, step 9.

9. Reel Shift Limiter Sensor position check/adjustment
   Refer to Section 6-7-4, step 10.

10. Reel position NOV-RAM data input
    Refer to Section 6-7-4, step 11.

11. Set Bit2 of S72 on the SSP-07 Board to OFF.

12. Cassette Compartment Ass'y installation
    Refer to Section 6-5.

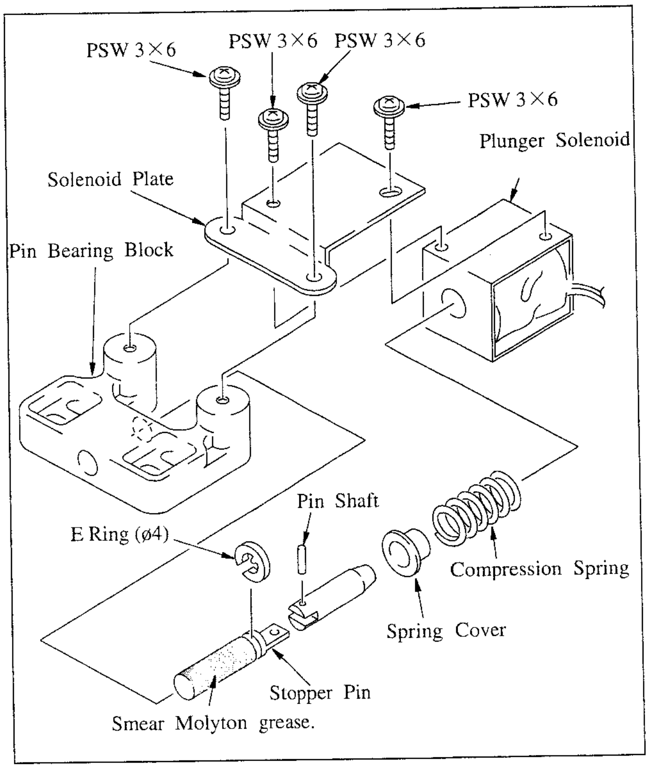
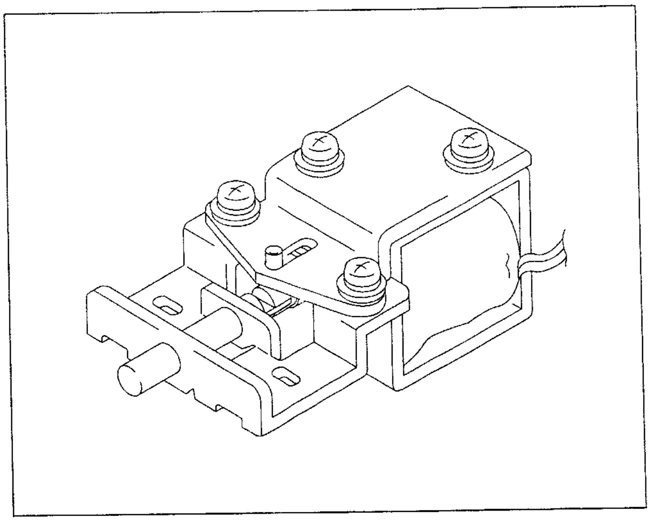


Fig. 6-8-29 M Stopper Ass'y Replacement



*3 **Fig. 6-8-29 (a) M Stopper Ass'y**

6-8-5. Reel Shift Potentiometer Ass'y Replacement

Basic Knowledge

A. The Reel Shift Potentiometer Ass'y (hereinafter called "potentiometer") is used to detect the position when the Reel Table moves.
The potentiometer is the block shown in Fig. 6-8-30.
The replacement of the potentiometer is described below:

(1) PM Gear Block Replacement

(2) Reel Shift Potentiometer Replacement

B. Prepare the following tools for adjustment after replacement.
- EX-185 Board (attachment DVR-28)
  Sony Parts No.: A-6001-015-A
- Tension Scale (5kg-cm)
  Sony Parts No.: J-6041-640-A
- Tension Measuring Tool
  (String or wire rope that can withstand a 6 kg force.)
- L/M/S cassette tapes (for general use)

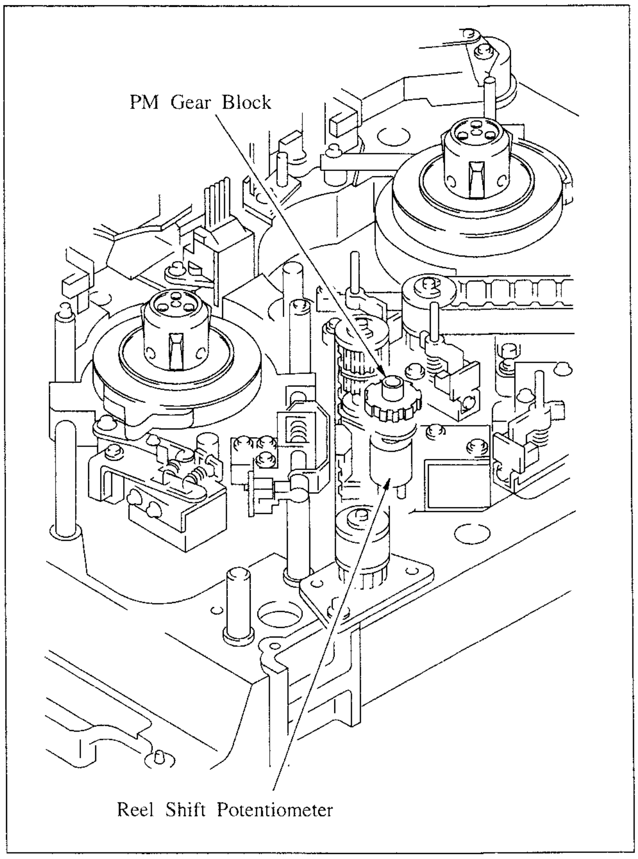
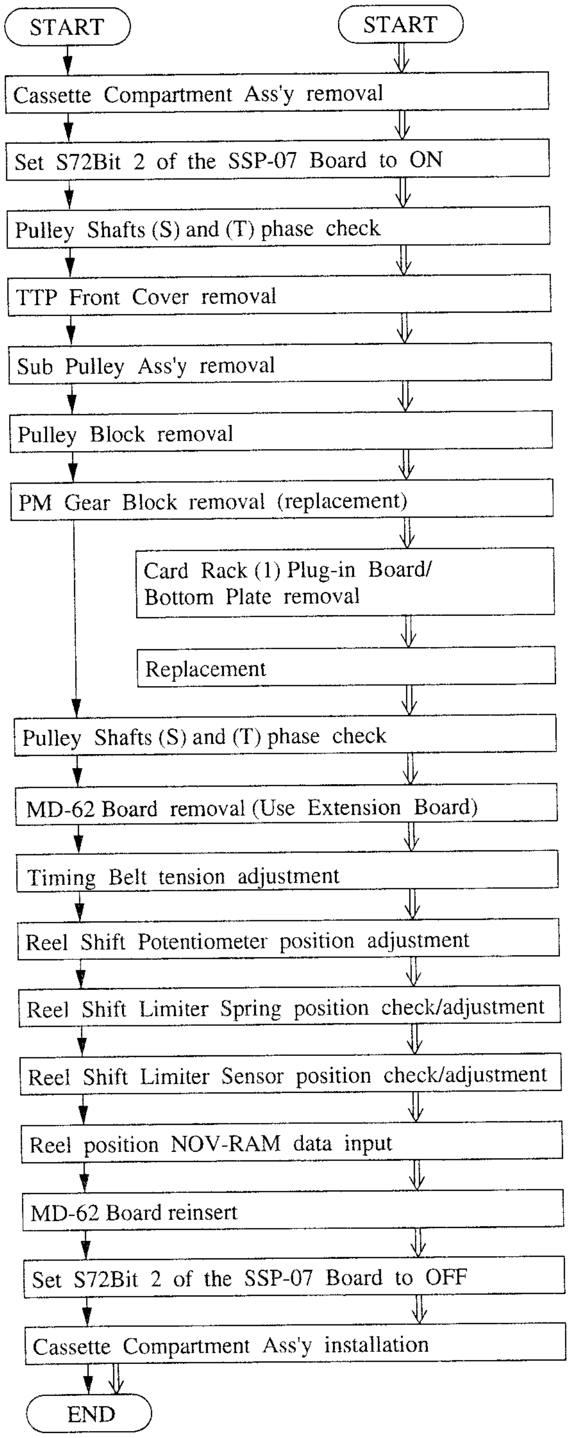


Fig. 6-8-30 Reel Shift Potentiometer Ass'y

C. Replacement flowchart

(1) Replacement of PM Gear Block (2) Replacement of Reel Shift Potentiometer


START
START
Cassette Compartment Ass'y removal
Set S72Bit 2 of the SSP-07 Board to ON
Pulley Shafts (S) and (T) phase check
TTP Front Cover removal
Sub Pulley Ass'y removal
Pulley Block removal
PM Gear Block removal (replacement)
Card Rack (1) Plug-in Board/ Bottom Plate removal
Replacement
Pulley Shafts (S) and (T) phase check
MD-62 Board removal (Use Extension Board)
Timing Belt tension adjustment
Reel Shift Potentiometer position adjustment
Reel Shift Limiter Spring position check/adjustment
Reel Shift Limiter Sensor position check/adjustment
Reel position NOV-RAM data input
MD-62 Board reinsert
Set S72Bit 2 of the SSP-07 Board to OFF
Cassette Compartment Ass'y installation
END

(1) PM Gear Block Replacement

Basic Knowledge

Before replacement, be familiar with the replacement procedure and prepare the necessary tools with reference to Basic Knowledge of Section. 6-8-5.

1. Cassette Compartment Ass'y installation
   Refer to Section 6-5.

2. Set Bit2 of S72 on the SSP-07 Board to ON.
   Refer to Item D of the Basic Knowledge of Sec. 6-8.

   Note: Set Bit2 of S72 on the SSP-07 Board to OFF after the adjustment.

3. Pulley Shafts (S) and (T) Phase Check
   Refer to Item B of Section 6-8 Basic Knowledge.

4. TTP Front Cover removal (Fig. 6-8-31)
   Remove the two screws fixing the TTP Front Cover, and then remove the TTP Front Cover.

5. Turn the power on. Then set the Reel Shift Test Menu.
   [Reel Shift Test Menu setting method]
   Refer to Item C of Basic Knowledge of Section 6-8.

6. Set the reel position to L, and turn the power off.
   [Reel Shift Test Menu setting method]
   Refer to Item C of Basic Knowledge of Secti 6-8.

7. Sub-Pulley Ass'y installation
   Remove the two screws fixing the Sub-Pulley Ass'y, then remove the Sub-Pulley Ass'y.

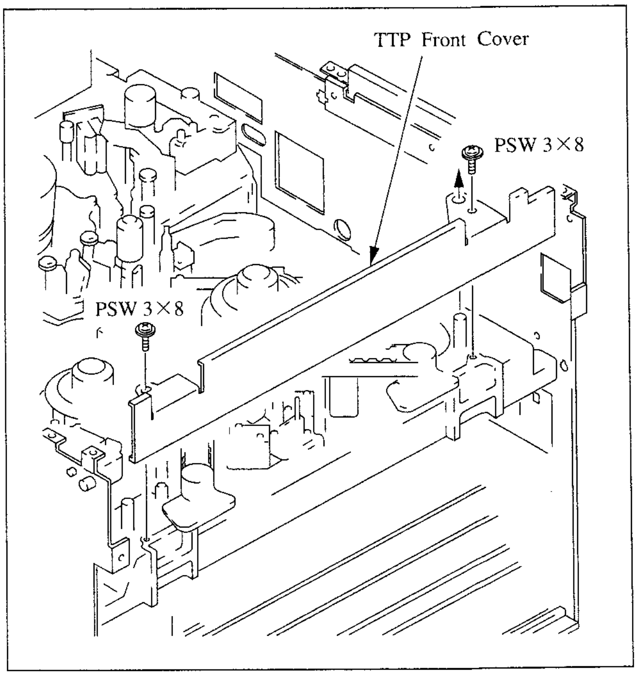


Fig. 6-8-31 TTP Front Cover Removal

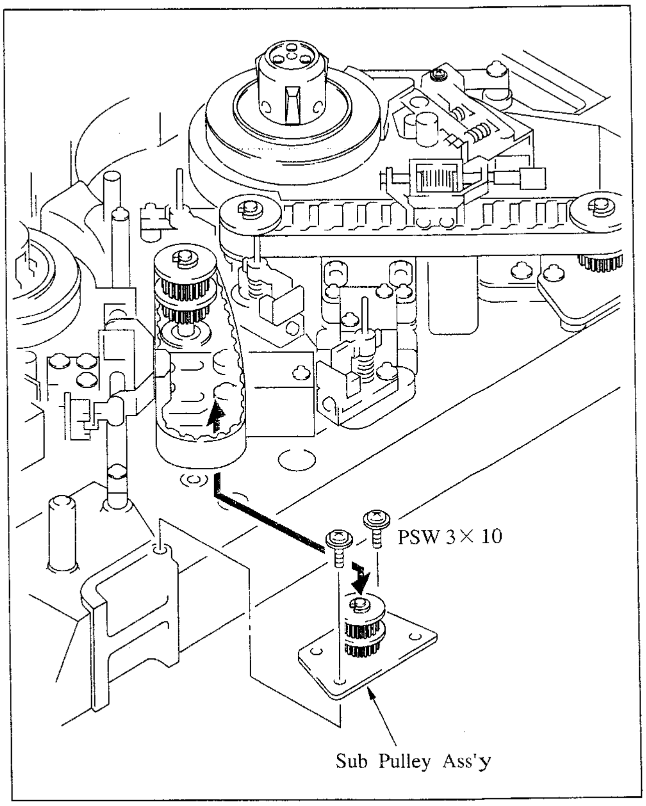


Fig. 6-8-32 Sub-Pulley Ass'y Removal

8. Pulley Block removal (Fig. 6-8-33)
   Remove the E ring fixing the pulley shown in Fig. 6-8-33. Then remove the Timing Belt and the Pulley Block.

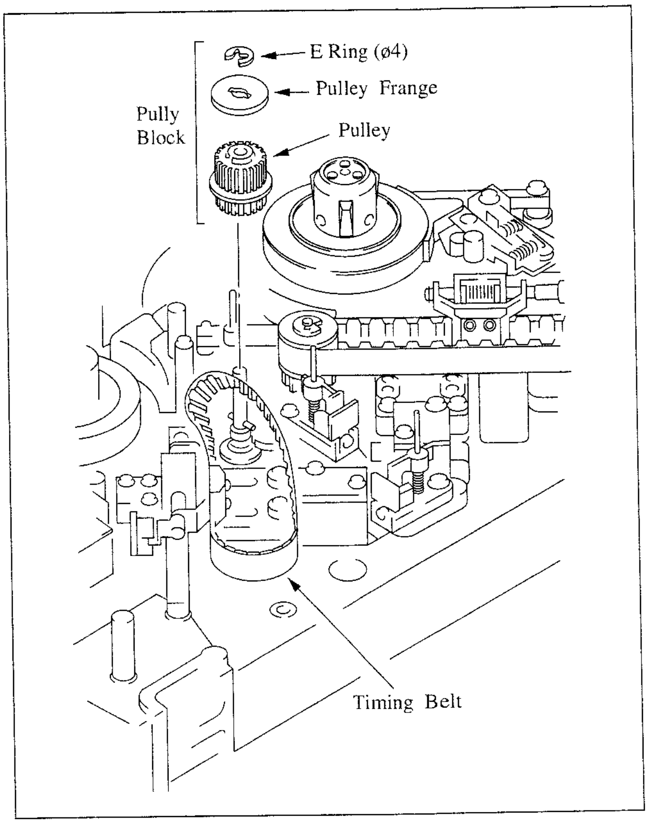

E Ring (ø4)
Pulley Frange
Pully Block
Pulley
Timing Belt

Fig. 6-8-33 Pulley Block Removal

9. PM Gear Block removal/replacement (Fig. 6-8-34).
   (1) Loosen the setscrew fixing the Gear Sleeve by one half to one turn. Then remove the PM Gear Block.

   (2) Replace components as required, and reassemble.

   Note: Mount the PM Gear Block so that the setscrew will be within the range shown in the figure.

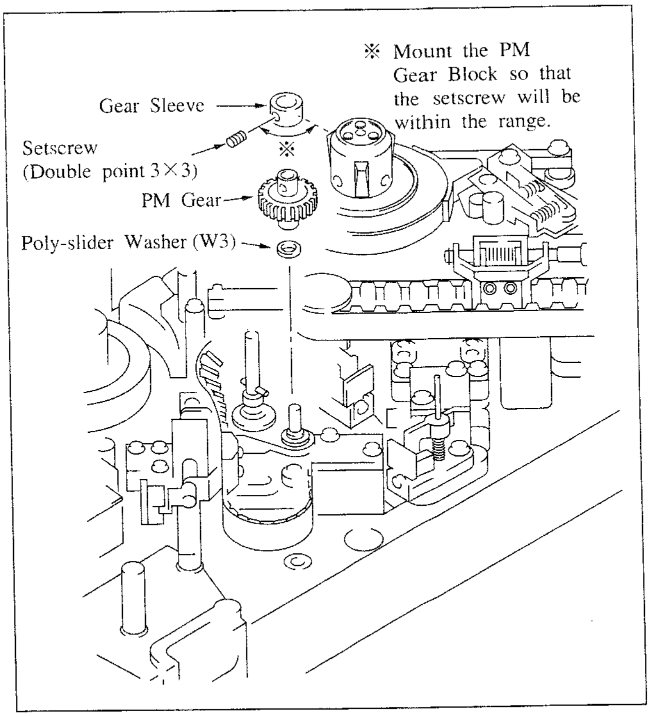

※ Mount the PM Gear Block so that the setscrew will be within the range.
Gear Sleeve
Setscrew
(Double point 3×3)
※
PM Gear
Poly-slider Washer (W3)

Fig. 6-8-34 PM Gear Block Removal

10. Detach the MD-62 Board (Plug-in Board) of the Card Rack (1) from the unit. Extend it with the EX-185 Board (extension board), then insert it again into the unit.
    [Use of Extension Board]
    Refer to Section 1-6.

11. Pulley block installation
    (1) Shift the Reel Table (S) shown in Fig. 6-8-35 in the direction indicated by arrow A.

    (2) Pulley Shafts (S) and (T) Check
    Refer to Item B of Section 6-8 Basic Knowledge.
    If the Pulley Shaft (S) or (T) is NG, turn the Worm Gear of the Reel Shift Motor using a finger as shown in Fig. 6-8-36.

    (3) Install the Pulley Block.

12. Place the Timing Belt on the pulley.

13. Place the Timing Belt on the Sub-pulley, and temporarily fix the Sub-Pulley Ass'y with two screws.

14. Timing Belt tension adjustment
    Refer to step 8 of Section 6-7-4.

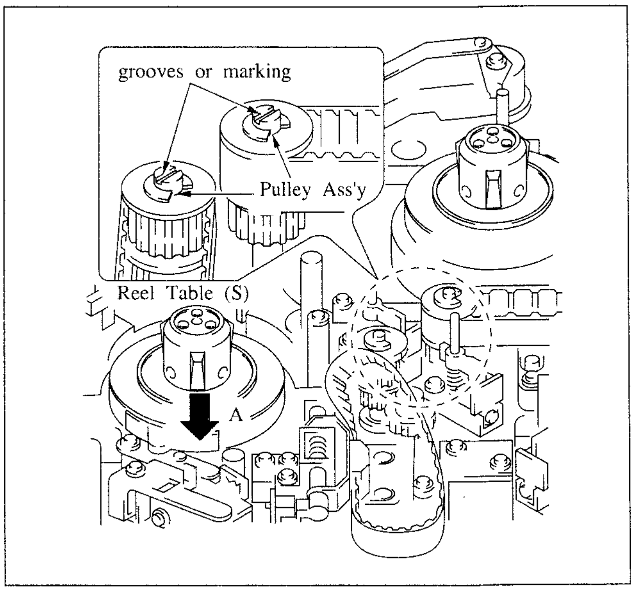


Fig. 6-8-35 Pulley Block Installation

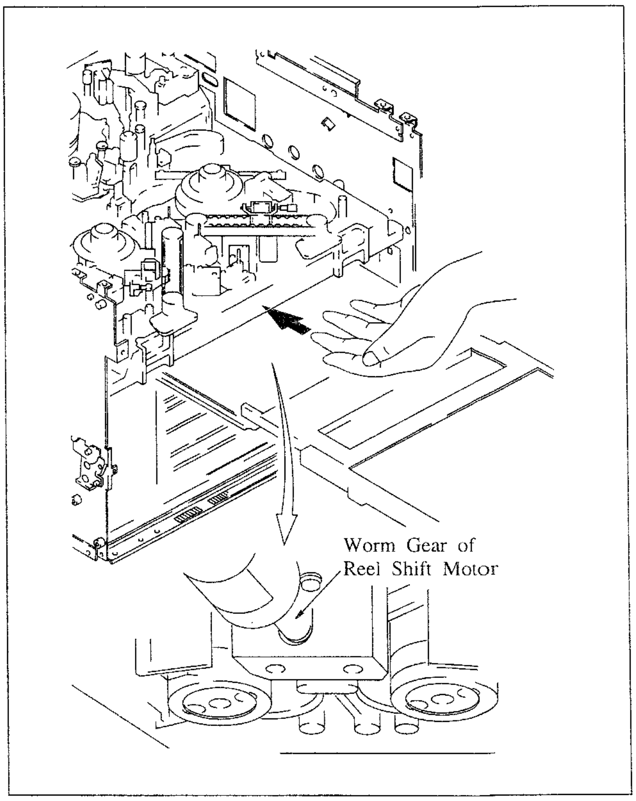


Fig. 6-8-36 Worm Gear of the Reel Shift Motor

15. Reel Shift Potentiometer position check/adjustment
    [Potentiometer position checking]
    (1) Turn the power on, and set the Reel Shift Test Menu.
        [Reel shift test menu setting]
        Refer to Item C of Basic Knowledge of Section. 6-8.

    (2) Shift the reel position from L to M position, and stop the red at a point where the Limiter Spring (T) shown in Fig. 6-8-37 starts contracting. Then, turn counterclockwise the Worm Gear of the Reel Shift Motor Ass'y shown in the figure, and clear the contraction of the limiter Spring (T). Turn the potentiometer shaft so that the data of the part A on the control panel will satisfy the specification A.

```
XX**      XXXXXXXXB
  └──── A portion
```

Specification A: 6F ± 01 Hex
(6E through 70 Hex)

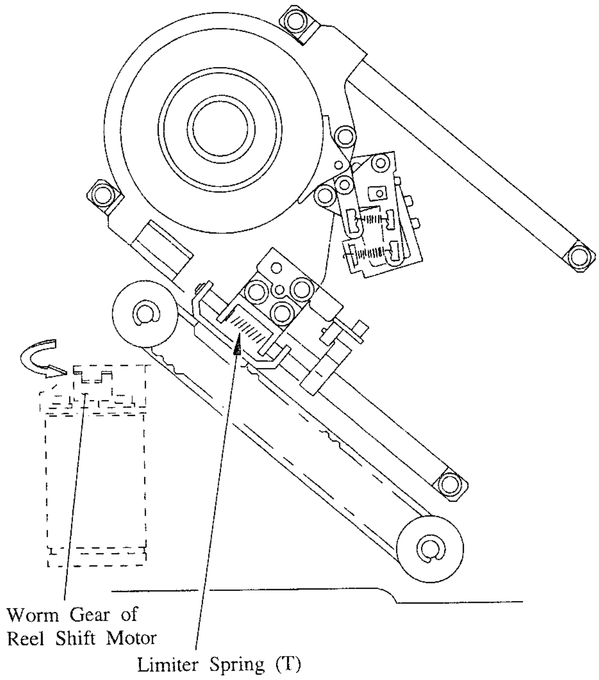


Fig. 6-8-37 Limiter Springs (T)

[Potentiometer position adjustment]

(3) Remove the screw fixing the UB PIN Ass'y, and remove the UB PIN Ass'y.
Put the UB PIN Ass'y in a place where it will not hamper the work.

(4) Shift the reel position from L to M position, and stop the reel at a point where the Limiter Spring (T) shown in Fig. 6-8-37 starts contracting. Then, turn counterclockwise the Worm Gear of the Reel Motor Ass'y shown in the figure, and clear the contraction of the limiter spring (T).
Loosen the setscrew by a half to one turn. (Fig. 6-8-39)
Turn the potentiometer shaft so that the data on the control panel cportion A is 6F.

```
XX**   XXXXXXXXB
 └──── A portion
```

(5) After adjustment, tighten the setscrew.

(6) Confirm that the data of the part A on the control panel will satisfy the specification A below.

Specification A: 6F ± 01 (Hex)
(6E through 70 Hex)

(7) Turn the power off.

(8) Apply a small amount of locking compound (Screw lock) on the head of the setscrew shown in Fig. 6-8-39.

(9) Install the UB PIN Ass'y in the reverse order of step (3).

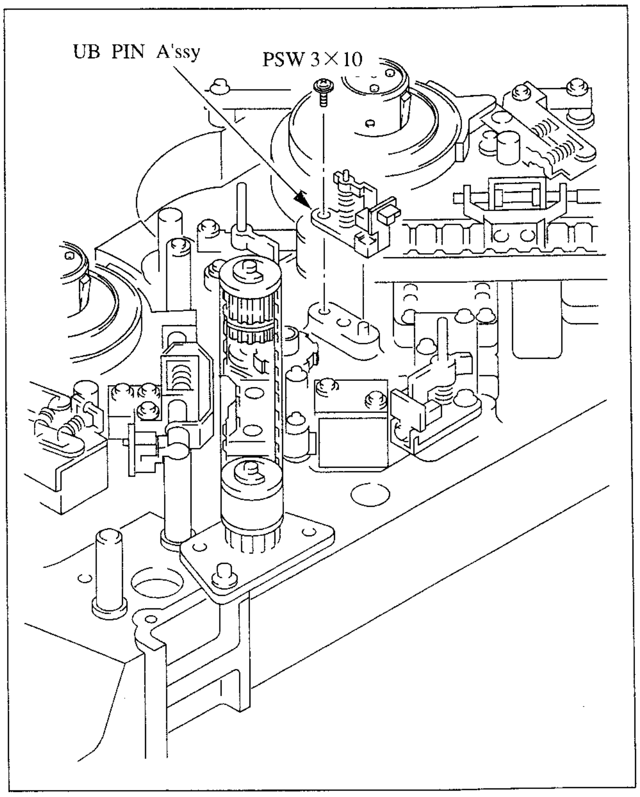


Fig. 6-8-38 UB PIN Ass'y Removal

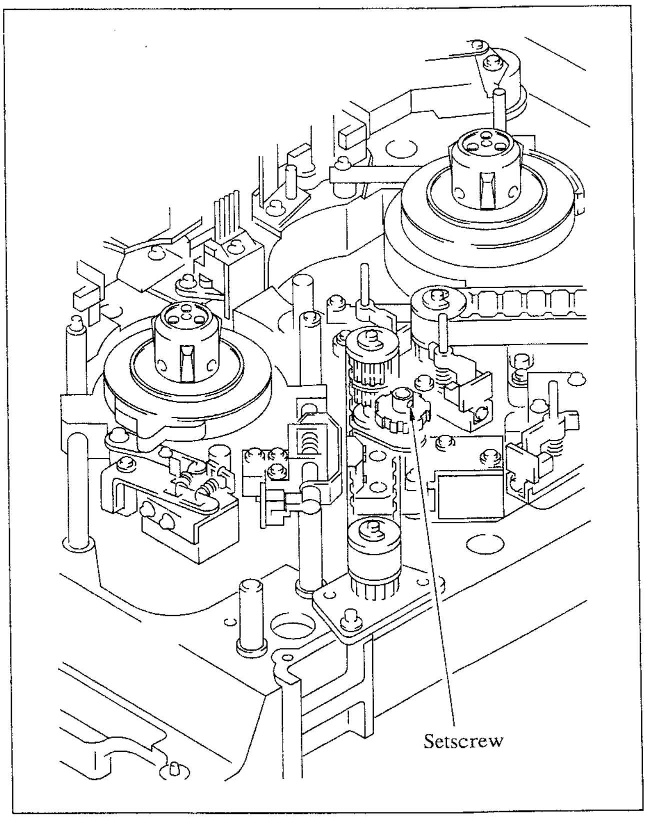


Fig. 6-8-39 Locking Compound Application

16. Reel Shift Limiter Spring position check/adjustment
    Refer to step 9 of Section 6-7-4.

17. Reel Shift Limiter Sensor position check/adjustment
    Refer to step 10 of Section 6-7-4.

18. Reel position NOV-RAM data input
    Refer to step 11 of Section 6-7-4.

19. Remove the MD-62 Board and EX-138 Board (extension board) from the unit, and insert the MD-62 Board again.

20. Set Bit2 of S72 on the SSP-07 Board to OFF.

21. Cassette Compartment Ass'y installation
    Refer to Section 6-5.

22. Check the operation of the Reel Shift.
    - Insert the L/M/S cassette tapes, and confirm that the reel shifts smoothly.
    - Confirm that the cassette tape runs normally.

(2) Reel Shift Potentiometer Replacement

Basic Knowledge

Before starting replacement, refer to Basic Knowledge of Section 6-8-5 to be informed of the replacement procedure and prepare the necessary tools.

Replacement

1. Perform steps 1 through 9 of Section 6-8-5 (7) for the replacement of the PM Gear Block.
   - Remove the Cassette Compartment.
   - Set Bit2 of S72 on the SSP-07 Board to ON.
   - Remove the TTP Front Cover.
   - Remove the Sub-Pulley Ass'y.
   - Remove the Pulley Block.
   - Remove the PM Gear Block.

2. Perform steps 5 and 6 of Section 6-8-3.
   - Remove the Plug-in Boards of the Card Rack (1).
   - Remove the Bottom Plate.

3. Remove two screws (1) shown in Fig. 6-8-40, and remove the WG Cover.

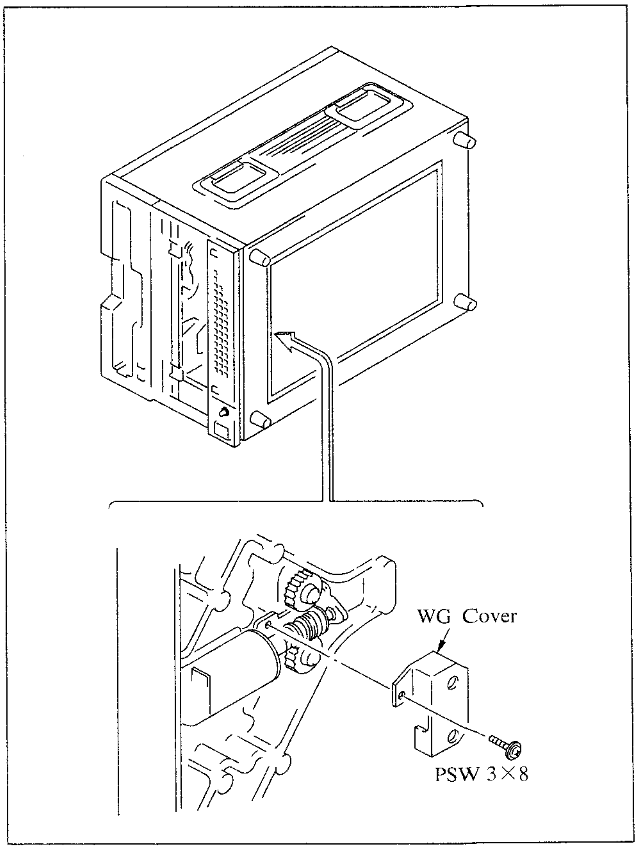


Fig. 6-8-40 WG Cover Removal

4. Pull off the connector CN352 from the SE-122 Board shown in Fig. 6-8-41, and remove the harness (CN352) from the harness clamp.

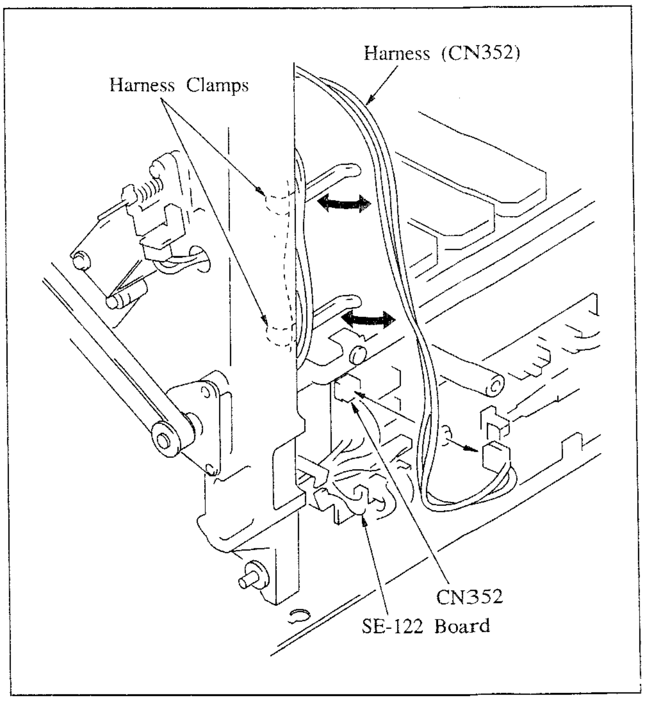


Fig. 6-8-41 Harness (CN352) Removal

5. Remove the Nut (M8) shown in Fig. 6-8-42, and remove the potentiometer.
   When removing the Nut (M8), a washer comes off at the same time. Be careful not to miss the washer.
   Use a box wrench (Across flats of 8 mm).

6. Clean the potentiometer mounting surface on the back of the Base Plate, with a cleaning piece moistened with cleaning liquid.

7. Assemble a new potentiometer in the reverse order of steps 1 to 5.
   - Nut (M8) tightening torque: 88.2×10^{-2} N·m (9 kg·cm)
   - Place the MD-62 Board (Plug-in Board) of the Card Rack (1) extended with the EX-138 Board (extension board).

   [Use of Extension Board]
   Refer to Section 1-6.
   - This step does not refer to installation of the Cassette Compartment.

8. Timing Belt tension adjustment
   Refer to step 8 of Section 6-7-4.

9. Reel Shift Potentiometer position adjustment
   Refer to step 14 of Section 6-8-5 (1) for the replacement of the PM Gear Block.

10. Reel Shift Limiter Spring position check/adjustment
    Refer to step 9 of Section 6-7-4.

11. Reel Shift Limiter Sensor position check/adjustment
    Refer to step 10 of Section 6-7-4.

12. Reel position NOV-RAM data input
    Refer to step 11 of Section 6-7-4.

13. Remove, the MD-62 Board and EX-138 Board (extension Board), from the unit and insert the MD-62 Board again.

14. Cassette Compartment Ass'y installation
    Refer to Section 6-5.

15. Set Bit2 of S72 on the SSP-07 Board to OFF.

16. Check the operation of the Reel Shift.
    - Insert the L/M/S cassette tapes, and confirm that the reel shifts smoothly.
    - Confirm that the cassette tape runs normally.

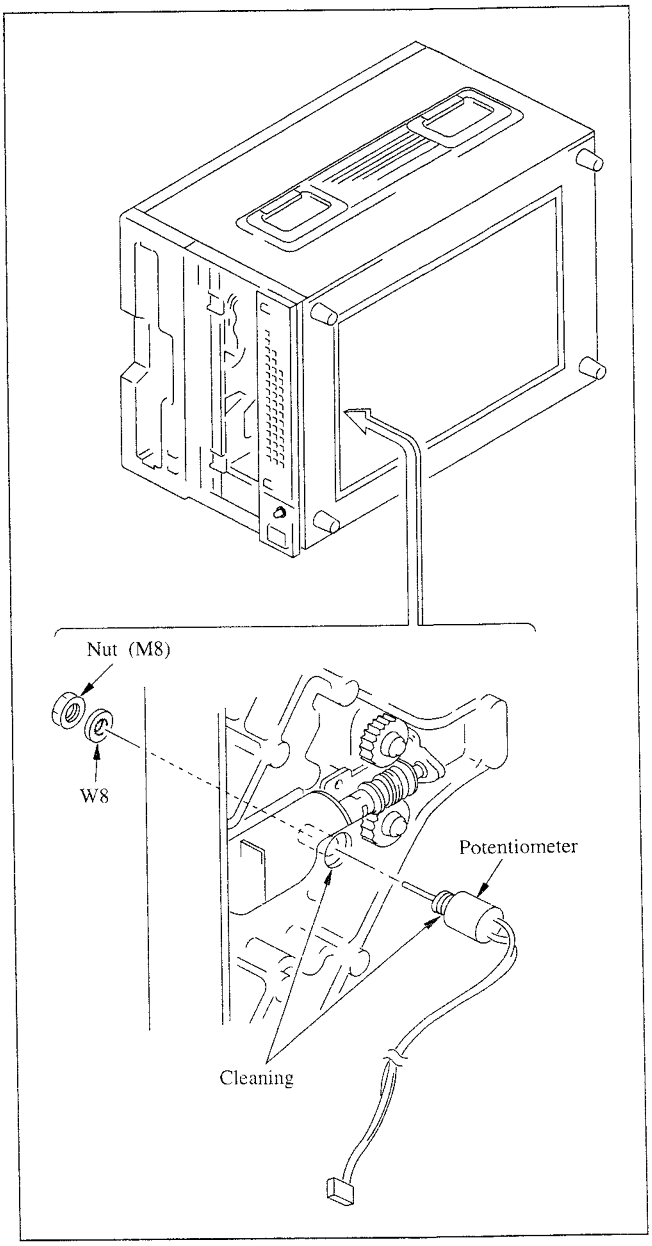


Fig. 6-8-42 Potentiometer Removal

6-9. S TENSION REGULATOR ASS'Y COMPONENTS REPLACEMENT

Basic Knowledge

A. The S Tension Regulator Ass'y is shown in Fig. 6-9-1. This section is concerned with the following components of the S Tension Regulator Ass'y.

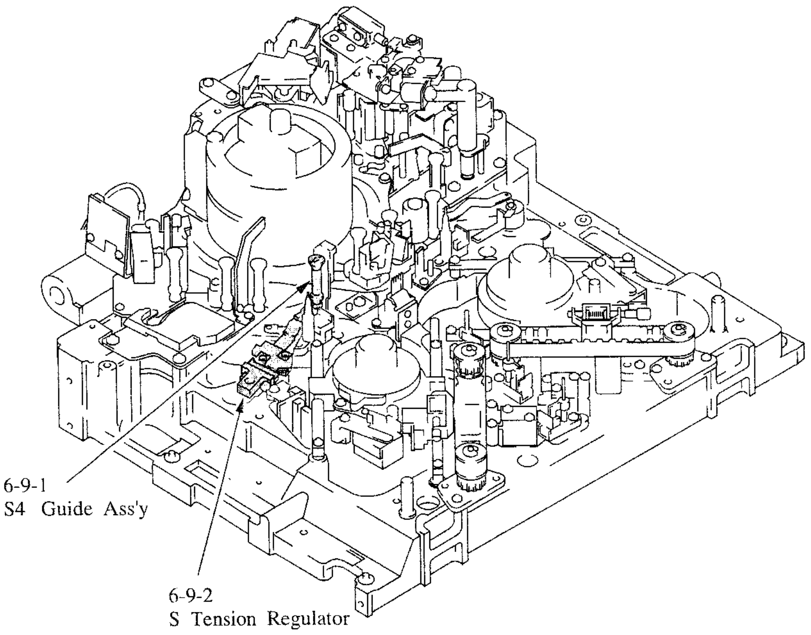
6-9-1. S4 Guide Ass'y Replacement
6-9-2. S Tension Regulator Ass'y Replacement
6-9-3. S Side Tape Tension Adjustment

B. Some parts of the S4 Guide Ass'y was changed on the following sets. But the replacement procedures and adjustment procedures were all the same.

DVR-28 (UC) : S/N 12501 and higher
DVR-28P (UC) : S/N 11903 and higher
DVR-28P (EK) : S/N 12001 and higher
DVR-P28 (UC) : S/N 10401 and higher

C. Prepare the following tools.

- Master Block (S3)
  Sony Parts No. : J-6253-340-A
- Confidence Head Adjustment Plate
  Sony Parts No. : J-6257-140-A
- Cleaning liquid (or equivalent)
  Sony Parts No. : 9-919-573-00
- Cleaning piece
  Sony Parts No. : 2-034-697-00



(This illustration is DVR-28)

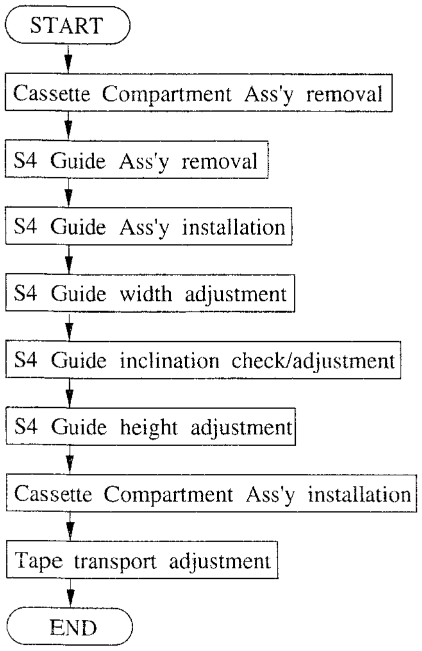
Fig. 6-9-1 S Tension Regulator Ass'y

6-9-1. S4 Guide Ass'y Replacement

Basic Knowledge

A. Dismount the Cassette Compartment Ass'y before replacing the S4 Guide Ass'y.

B. Replacement flowchart


START
Cassette Compartment Ass'y removal
S4 Guide Ass'y removal
S4 Guide Ass'y installation
S4 Guide width adjustment
S4 Guide inclination check/adjustment
S4 Guide height adjustment
Cassette Compartment Ass'y installation
Tape transport adjustment
END

Replacement

1. Cassette Compartment Ass'y removal
   Refer to Section 6-5.

2. S4 Guide Ass'y removal (Fig. 6-9-2)
   (1) The components of the S4 Guide Ass'y can be dismounted by dismounting the Flange Retainer shown in the figure.

   Note1: The setscrew already controls the S4 Guide height. Do not turn it unless necessary.
   Note2: The parts with ※5 mark were changed on the following sets as shown in Fig. 6-9-2.
   DVR-28 (UC) : S/N 12501 and higher
   DVR-28P (UC) : S/N 11903 and higher
   DVR-28P (EK) : S/N 12001 and higher
   DVR-P28 (UC) : S/N 10401 and higher

   (2) Replace the components that must be replaced.

3. S4 Guide Ass'y installation
   (1) Clean the Roller Guide Shaft with a cloth (or gauze) which is moistened with cleaning liquid.
   (2) Clean the edges of the S Guide Ass'y with a cleaning piece which is moistened with cleaning liquid. After cleaning them, be sure to wipe them with a dry cloth 2 or 3 times.
   (3) Mount the components by reversing the step 2 procedure.

   Note: When install the Flange and Roller Guide, take care of their directions.

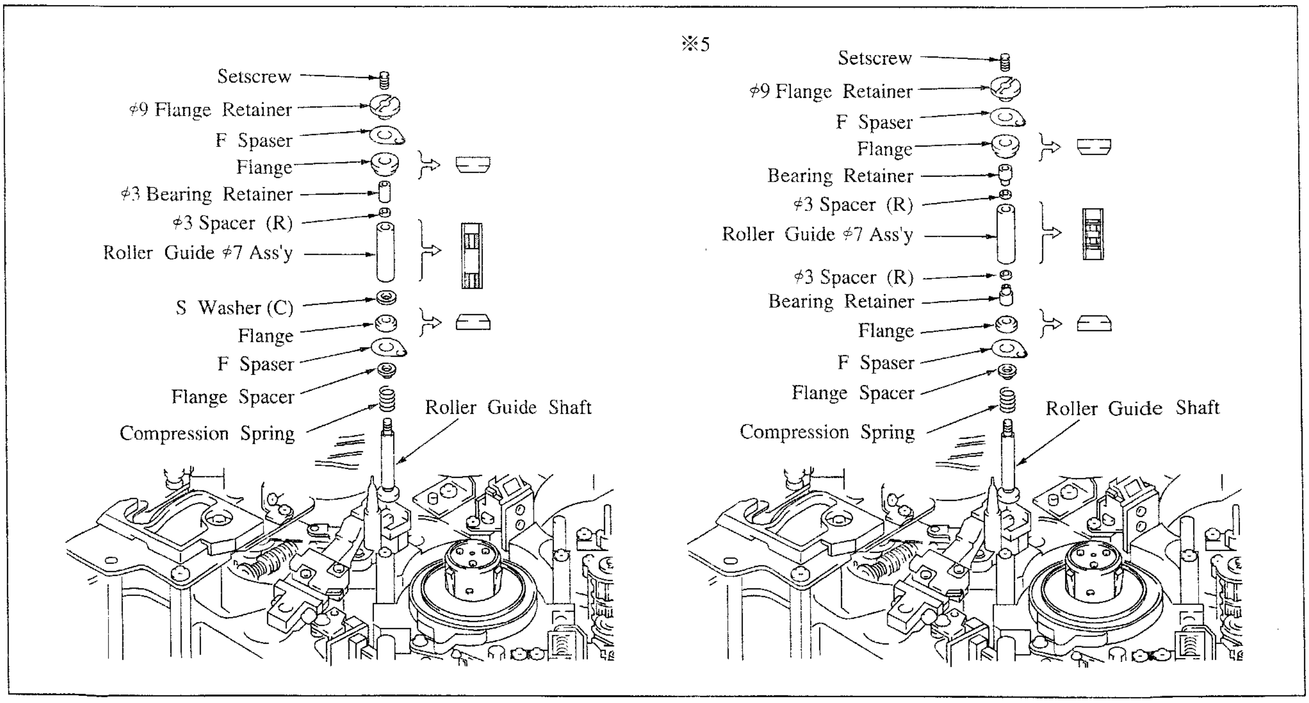

Setscrew
φ9 Flange Retainer
F Spaser
Flange
φ3 Bearing Retainer
φ3 Spacer (R)
Roller Guide φ7 Ass'y
S Washer (C)
Flange
F Spaser
Flange Spacer
Compression Spring
Roller Guide Shaft
※5
Setscrew
φ9 Flange Retainer
F Spaser
Flange
Bearing Retainer
φ3 Spacer (R)
Roller Guide φ7 Ass'y
φ3 Spacer (R)
Bearing Retainer
Flange
F Spaser
Flange Spacer
Compression Spring
Roller Guide Shaft

Fig. 6-9-2 S4 Guide Ass'y Removal

Adjustment

4. S4 Guide width adjustment

Preparation

- Turn the Worm Gear of the Loading Motor shown in Fig. 6-9-3 in arrow direction B. (Unthreading-end state)

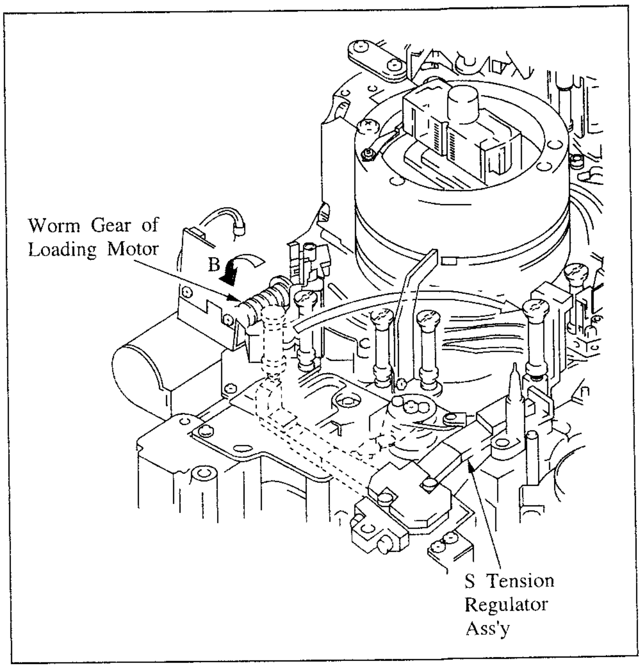

Worm Gear of Loading Motor
B
S Tension Regulator Ass'y

Fig. 6-9-3 Worm Gear of Loading Motor

Adjustment (Fig. 6-9-4)

(1) Tap the Confidence Head Adjustment Plate lightly against the Roller Guide in arrow direction A and make sure that the specification is satisfied.

Specification : Confidence Head Adjustment Plate: N side
This can go into the clearance between the Upper and Lower Flanges of the S4 Guide.
Confidence Head Adjustment Plate: W side
This cannot go into the clearance between the Upper and Lower Flanges of the S4 Guide.

Note: When tapping the Adjusting Plate against the Roller Guide, do not push down the Lower Flange. If the Lower Flange is moved, the S4 Guide width cannot be adjusted accurately.

(2) If the above specification is not satisfied, change the number of spacers (R) shown in Fig. 6-9-2 so that the specification may be satisfied.

(3) Turn the Roller Guide part by hand and make sure that it rotates smoothly. If it does not rotate smoothly, repeat the procedure from step (2).

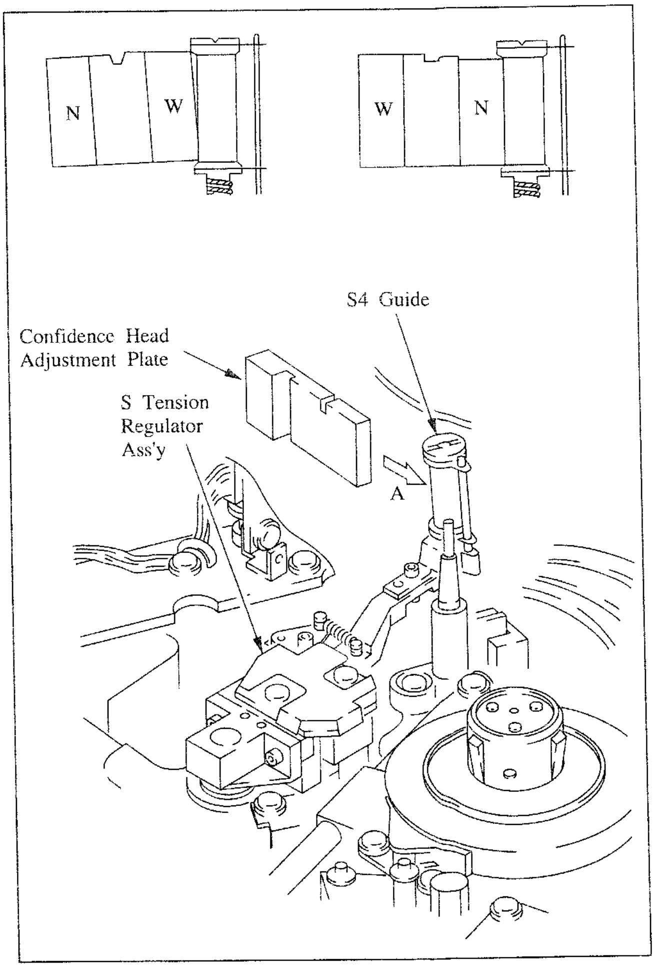

N
W
W
N
S4 Guide
Confidence Head Adjustment Plate
S Tension Regulator Ass'y
A

Fig. 6-9-4 S4 Guide Width Adjustment

5. S4 Guide inclination check/adjustment
   Refer to step 5 in Section 6-9-2.

6. S4 Guide height adjustment
   Refer to step 6 in Section 6-9-2.

7. Cassette Compartment Ass'y installation
   Refer to Section 6-5.

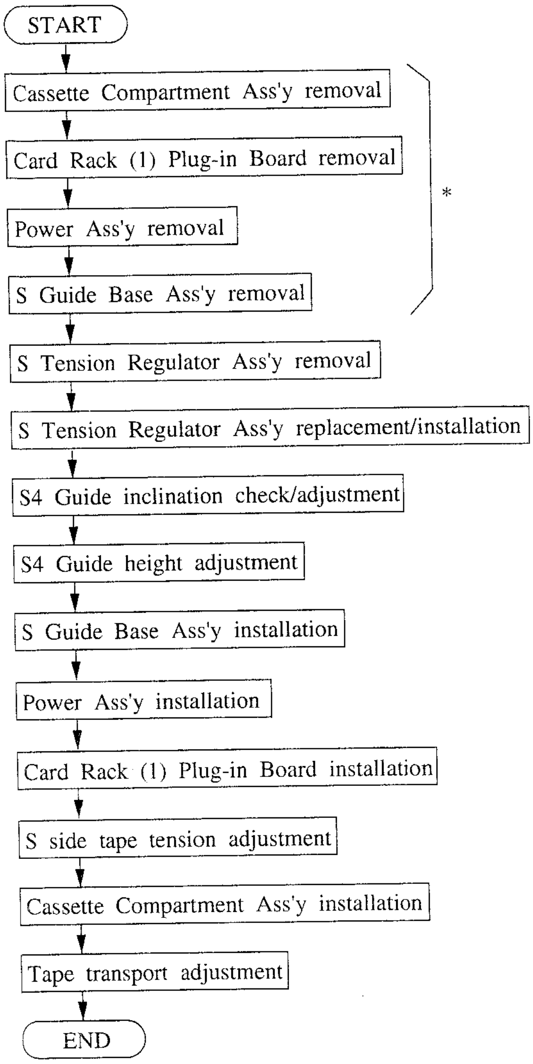
8. Tape transport adjustment
   Refer to Section 9.

6-9-2. S Tension Regulator Ass'y Replacement

Basic Knowledge

A. The following * marked parts must be dismounted before the replacement.

B. Replacement flowchart


START
Cassette Compartment Ass'y removal
Card Rack (1) Plug-in Board removal
Power Ass'y removal
S Guide Base Ass'y removal
*
S Tension Regulator Ass'y removal
S Tension Regulator Ass'y replacement/installation
S4 Guide inclination check/adjustment
S4 Guide height adjustment
S Guide Base Ass'y installation
Power Ass'y installation
Card Rack (1) Plug-in Board installation
S side tape tension adjustment
Cassette Compartment Ass'y installation
Tape transport adjustment
END

Removal

1. Cassette Compartment Ass'y removal
   Refer to Section 6-5.

2. Card Rack (1) Plug-in Board removal
   Refer to Section 6-2.
   Power Ass'y removal
   Refer to Section 2-5-3.

3. S Guide Base Ass'y removal (Fig. 6-9-5)
   (1) Remove the screws which fix the Tape Protector and dismount the Tape Protector.
   (2) Disconnect the connector (CN-1) which is connected to the PC-63 Board and dismount the harness from the harness clamp.
   (3) Remove the two screws which fix the S Guide Base Ass'y and dismount the S Guide Base Ass'y.

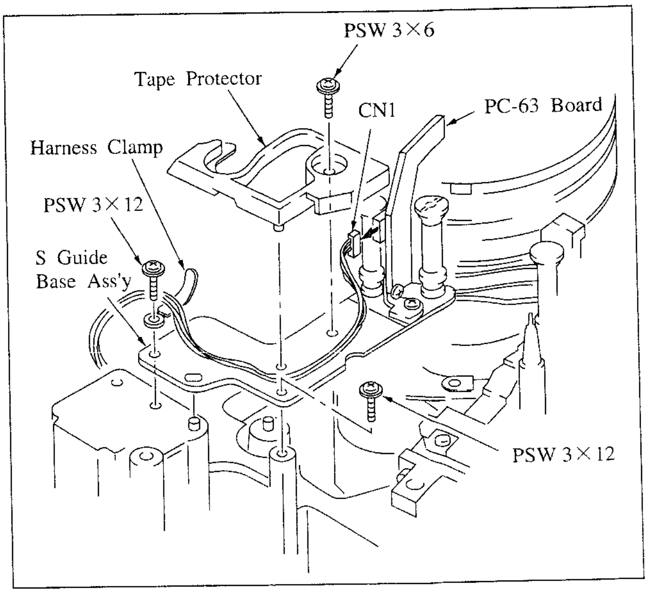

PSW 3×6
Tape Protector
CN1
PC-63 Board
Harness Clamp
PSW 3×12
S Guide Base Ass'y
PSW 3×12

Fig. 6-9-5 S Guide Base Ass'y Removal

4. S Tension Regulator Ass'y removal
   - Take the following steps also when the parts of the bearing Section of the S Tension Regulator Ass'y must be replaced.

(1) Lay the machine on its side so that the power block side is face down. (Fig. 6-9-9)

Note: Work slowly to ensure no shock is applied to the machine.

(2) Take out the four screws which fix the Bottom Cover and remove the Bottom Cover.

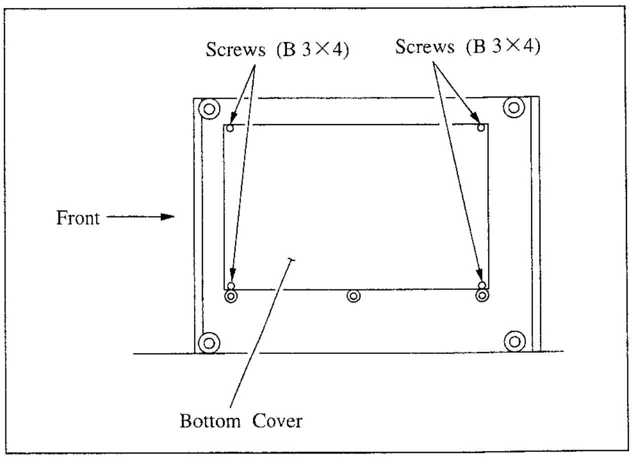


Fig. 6-9-6 **Bottom Cover Removal**

Remove the screw shown in Fig. 6-9-7 while holding the S Tension Regulator Ass'y from the top of the machine by hand.

Note: When this screw is removed, the coil spring the motor spacer and the ball bearing will come off at the same time. Do not let them fall into the machine. (Fig. 6-9-9)

(3) Lay the machine horizontally again.

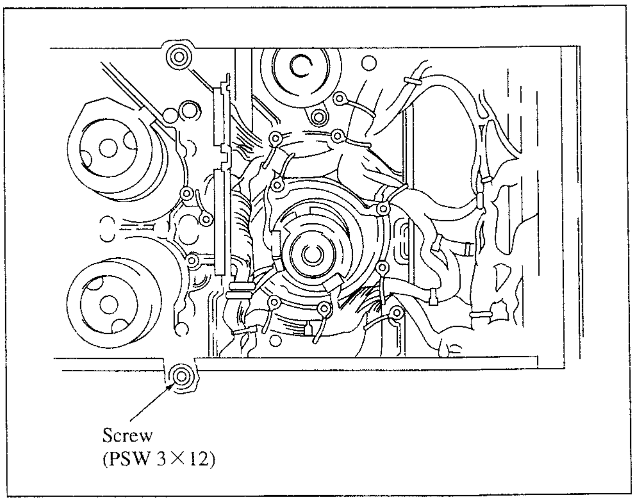


Fig. 6-9-7 **Removal of Setscrews of S Tension Regulator Ass'y**

(4) Remove the E Ring and the Flexible Card Wire shown in Fig. 6-9-8.

Remove the Flexible Card Wire by referring to Section 2-7-4.

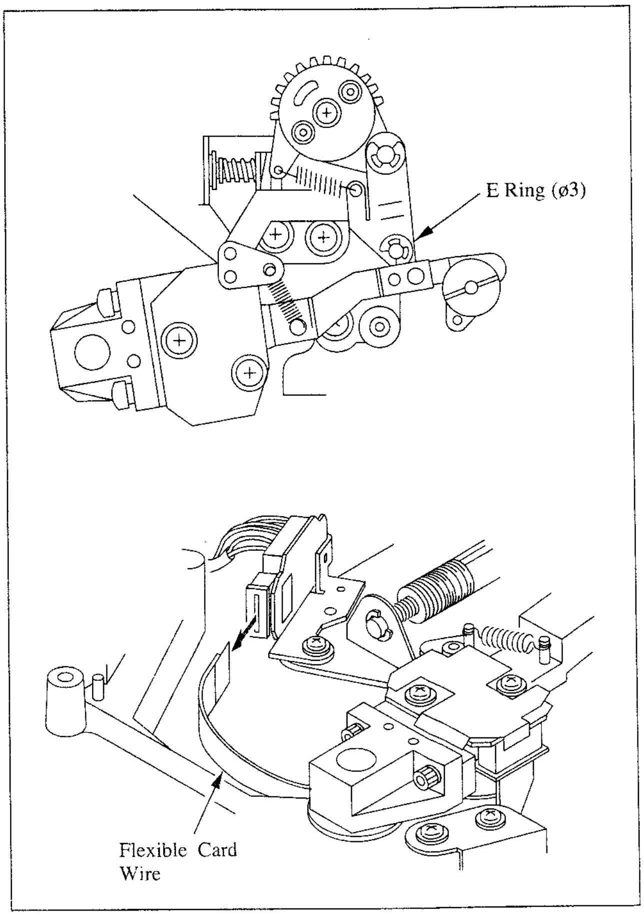

E Ring (ø3)
Flexible Card Wire

Fig. 6-9-8 E Ring and Flexible Card Wire Removal

(5) Take out the S Tension Regulator Ass'y by pulling it forward. (Fig. 6-9-9)

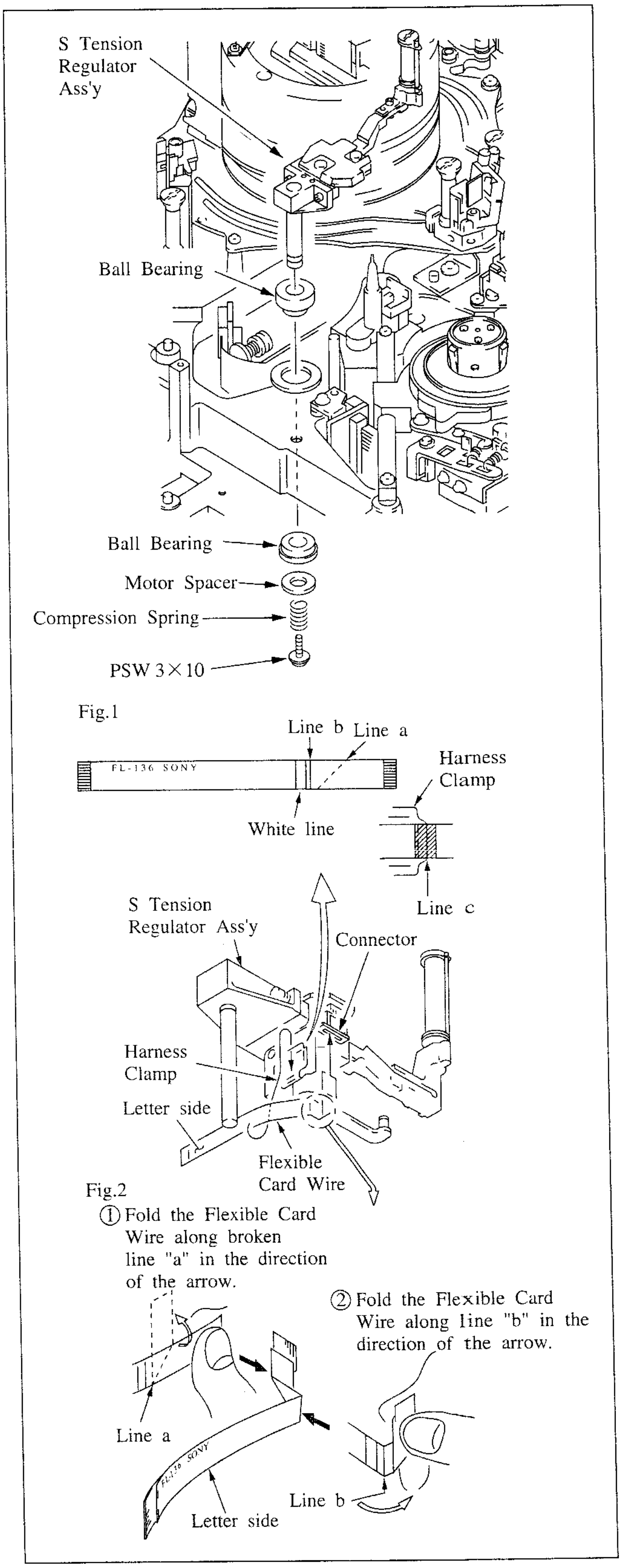
(6) Disconnect the Flexible Card Wire from the connector. Then, remove it from the harness clamp.

Note 1: Handle the Flexible Card Wire with sufficient care. Do not bend it except the illustrated part.

- When replacing the Flexible Card Wire, bend the Flexible Card Wire as shown in Fig. 2 before connecting it to the S Tension Regulator Ass'y.

Note 2: Do not bend it repeatedly, or its service life will be shortened tremendously.

- In mounting the Flexible Card Wire on the S Tension Regulator Ass'y, make sure that line C of the harness clamp shown in Fig. 1 is inside the white line of the Flexible Card Wire.


S Tension Regulator Ass'y
Ball Bearing
Ball Bearing
Motor Spacer
Compression Spring
PSW 3×10
Fig.1
Line b
Line a
FL-136 SONY
Harness Clamp
White line
Line c
S Tension Regulator Ass'y
Connector
Harness Clamp
Letter side
Flexible Card Wire
Fig.2
Line a
Letter side
Line b

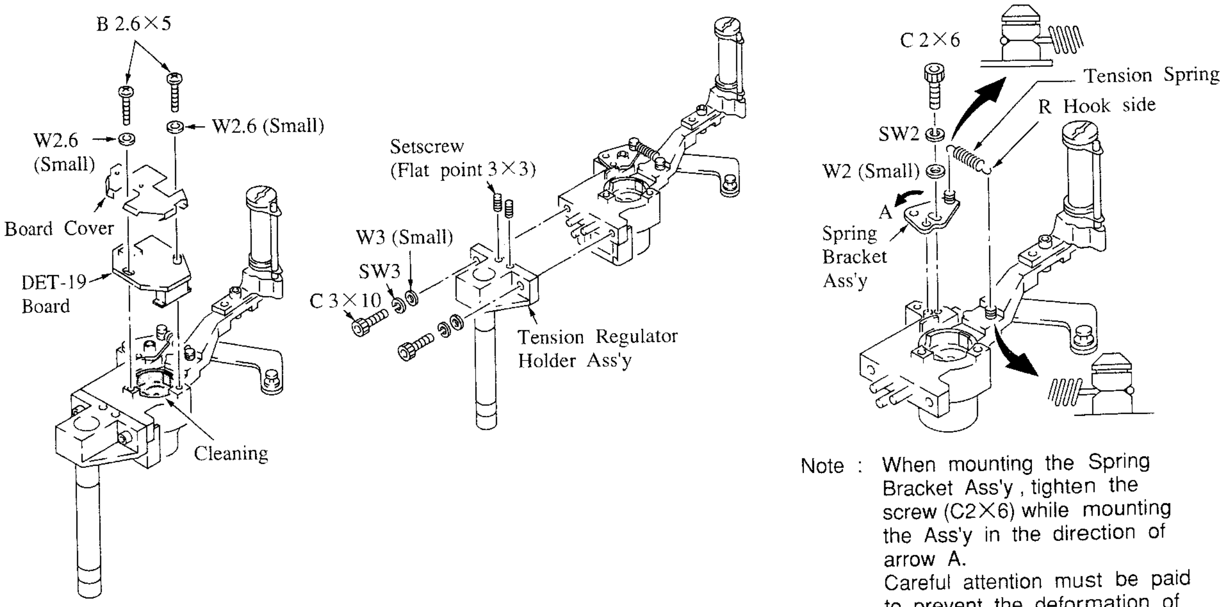
① Fold the Flexible Card Wire along broken line "a" in the direction of the arrow.

② Fold the Flexible Card Wire along line "b" in the direction of the arrow.

Fig. 6-9-9 S Tension Regulator Ass'y Removal

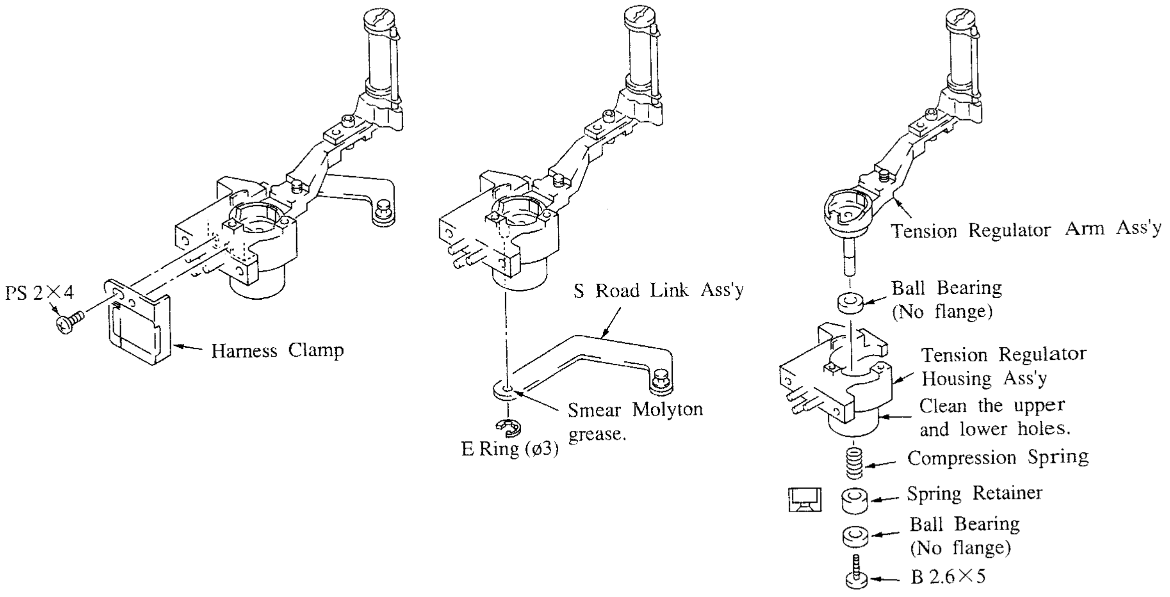
Replacement/Installation

5. Components replacement/installation
   (1) Replace the S Tension Regulator Ass'y components (Fig. 6-9-10) which must be replaced.
   (2) Mount the S Tension Regulator Ass'y in the machine by reversing the step 4 procedures.


- DET-19 Board Removal
- Tension Regulator Holder Ass'y Removal
- Spring Bracket/Tension Spring Removal

B 2.6×5
W2.6 (Small)
W2.6 (Small)
Board Cover
DET-19 Board
Cleaning
Setscrew (Flat point 3×3)
W3 (Small)
SW3
C 3×10
Tension Regulator Holder Ass'y
C 2×6
Tension Spring
R Hook side
SW2
W2 (Small)
A
Spring Bracket Ass'y

Note : When mounting the Spring Bracket Ass'y , tighten the screw (C2×6) while mounting the Ass'y in the direction of arrow A.
Careful attention must be paid to prevent the deformation of the spring and its hook.


- Harness Clamp Removal
- S Road Link Ass'y Removal
- Tension Regulator Housing Removal

PS 2×4
Harness Clamp
S Road Link Ass'y
Smear Molyton grease.
E Ring (ø3)
Tension Regulator Arm Ass'y
Ball Bearing (No flange)
Tension Regulator Housing Ass'y
Clean the upper and lower holes.
Compression Spring
Spring Retainer
Ball Bearing (No flange)
B 2.6×5

Fig. 6-9-10 S Tension Regulator Ass'y Components Replacement

Adjustment

6. S4 Guide inclination check/adjustment

Preparation

Set it to the threading-end state by turning the Worm Gear of the Loading Motor in arrow direction A. (Fig. 6-9-11)

S4 Guide inclination check (Fig. 6-9-12)

(1) Set the Master Block (S3) at the illustrated position.

(2) Put the Master Block against the S4 Guide from arrow directions a and b and make sure that the S4 Guide is not inclined. If it is inclined, adjust it by the following procedure.

S4 Guide inclination adjustment (Fig. 6-9-12)

Note: If mistake the steps so that tightening screw A and screw B at the adjustment, break the Tension Regulator Arm Ass'y.

(3) When put the Master Block against the S4 Guide from arrow direction a.
In the case of the S4 Guide is inclined in direction C:
Adjust the inclination of the S4 Guide by loosening screw B and tightening screw A.
After the adjustment, tighten screw B, then tighten screw A.

In the case of the S4 Guide is inclined in direction D:
Adjust the inclination of the S4 Guide by loosening screw A, and then by tinghtening screw B. After the adjustment, tighten screw A, then tighten screw B.

Tightening torque : 19.6 × 10^{-2} N·m (2 kgf·cm)
After tightening the screws, make sure that the S4 Guide is not inclined. If it is inclined, carry out step (3).

(4) When put the Master Block against the S4 Guide from arrow direction b.
In the case of the S4 Guide is inclined in direction E (or F):
① Loosen two screws C and leave them temporarily fixed.
② Adjust the inclination of the S4 guide by loosening screw D (or E) and tightening screw E (or D).
③ After the above adjustment, tighten two screws C.
Tightening torque : 78.4 × 10^{-2} N·m(8 kgf·cm)
④ Tighten screws D and E.
Tightening torque : 19.6 × 10^{-2} N·m(2 kgf·cm)
After tightening the screws, make sure that the S4 Guide is not inclined. If it is inclined, carry out step (4).

(5) Check the inclination by repeating step (2). If the S4 Guide is inclined, repeat the procedure from step (3) or (4).

(6) After completing the adjustment, apply a small amount of locking compound (Screw lock) to the heads of screws A to E.

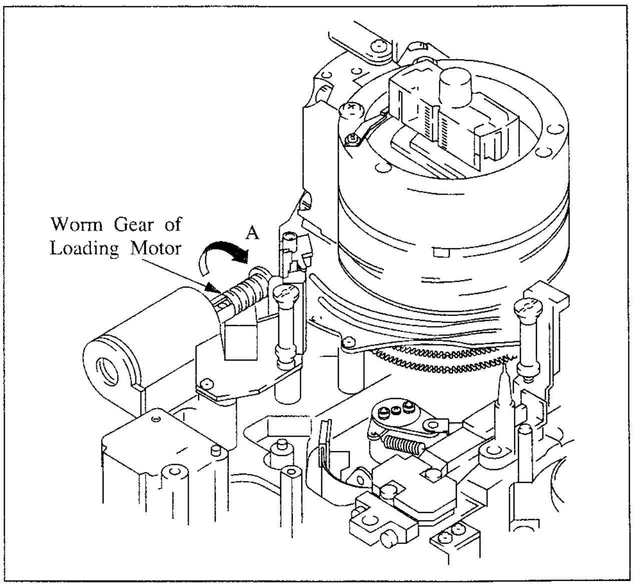


Fig. 6-9-11 Worm Gear of Loading Motor

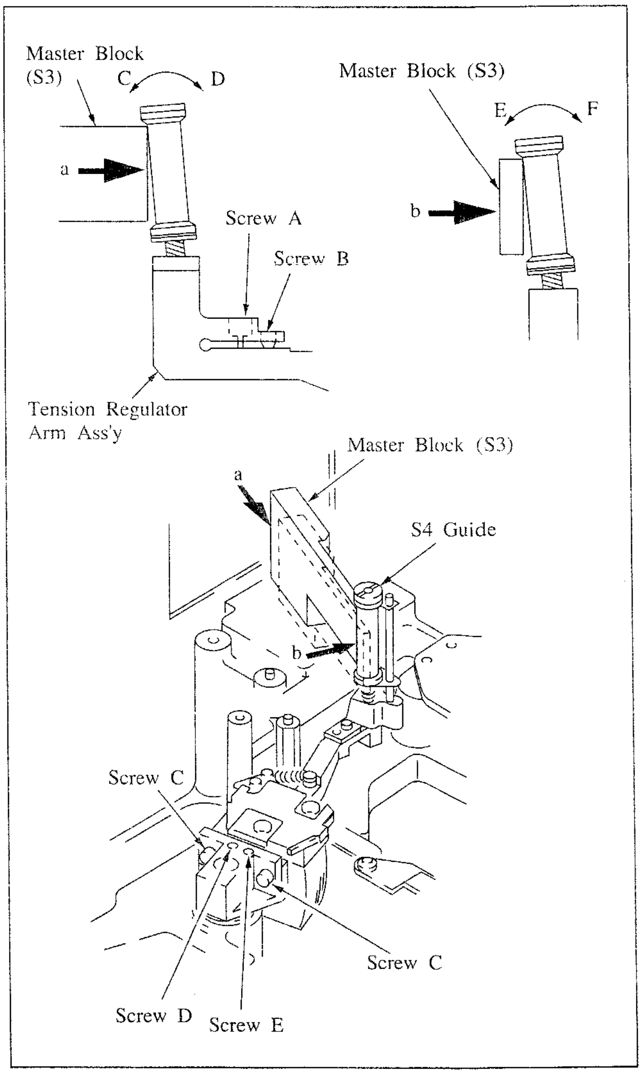


Fig. 6-9-12 S4 Guide Inclination Check/Adjustment

7. S4 Guide height adjustment

Preparation

- Set it to the threading-end state by turning the Worm Gear of the Loading Motor in arrow direction A. (Fig. 6-9-13)

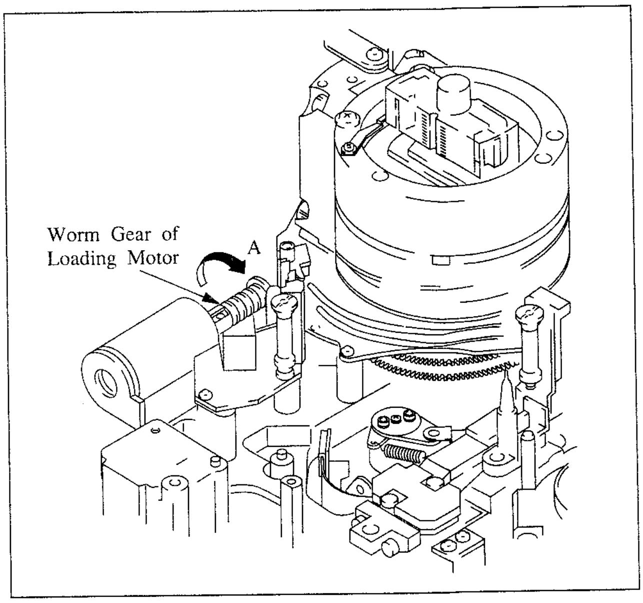


Fig. 6-9-13 Worm Gear of Loading Motor

Adjustment (Fig. 6-9-14)

(1) Set the Master Block (S3) at the illustrated position.

(2) Tap the Master Block lightly against the S4 Guide from the direction shown in Fig. 6-9-14. At this time, make sure that there is no clearance between the Lower Flange of the S4 Guide and the bottom of the Master Block.

Note: When tapping the Master Block against the S4 Guide, do not push down the Lower Flange. If the Lower Flange is moved, the S Guide height cannot be adjusted accurately.

If the specifications are not satisfied, make the following adjustment.

(3) Loosen the setscrew of the Flange Retainer by turning it half to one turn.

(4) Adjust the Flange Retainer by the following procedure.
- If there is a clearance between the Master Block and the Lower Flange (if the Lower Flange is too low): Turn the Flange Retainer in the counterclockwise.
- If the Master Block pushes down the Lower Flange (if the Lower Flange is too high) : Turn the Flange Retainer clockwise.

(5) Tighten the Flange Retainer setscrews and apply locking compound (Screw lock). Use a 1.5 mm hexagonal wrench.

Note: When tightening the setscrews, do not apply excessive force to the guide.

(6) After completing the adjustment, clean the S4 Guide Ass'y with a cleaning piece moistened with cleaning liquid. Be sure to wipe it with a dry cloth 2 or 3 times after cleaning.

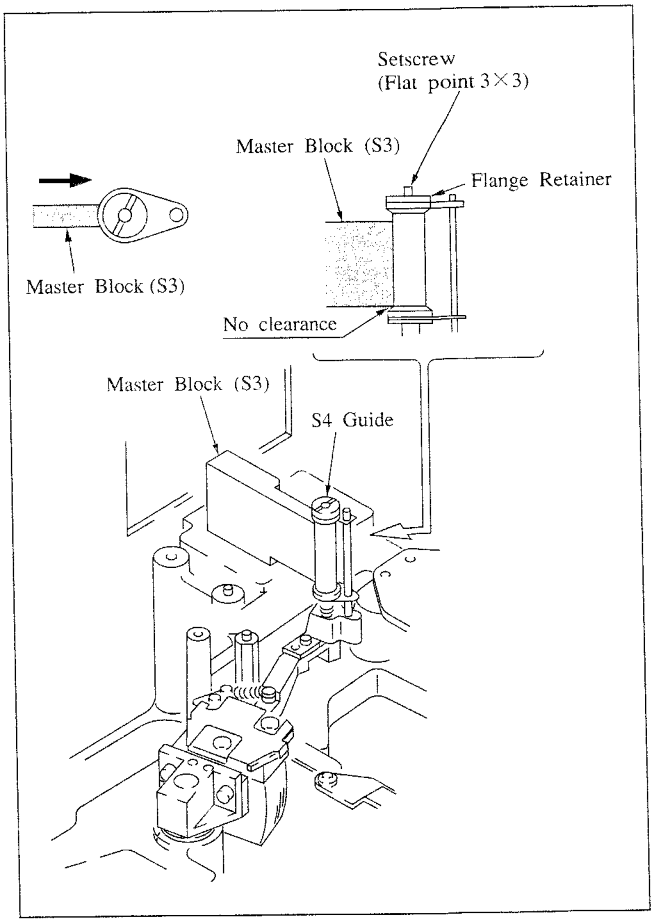


Fig. 6-9-14 S4 Guide Height Adjustment

8. S Guide Base Ass'y installation
   Mount the S Guide Base Ass'y by reversing the step 3 procedure.
   - Before mounting it, clean the mount surfaces of the S Guide Base Ass'y and the Base Plate with a cloth which is moistened with cleaning liquid.

9. Power Ass'y installation
   Carry out Step 2 in reverse order for Power Ass'y installation.

10. Card Rack (1) Plug-in Board installation
    Refer to Section 6-2.

11. S side tape tension adjustment
    Refer to Section 6-9-3.

12. Cassette Compartment Ass'y installation
    Refer to Section 6-5.

13. Tape transport adjustment
    Refer to Section 9.

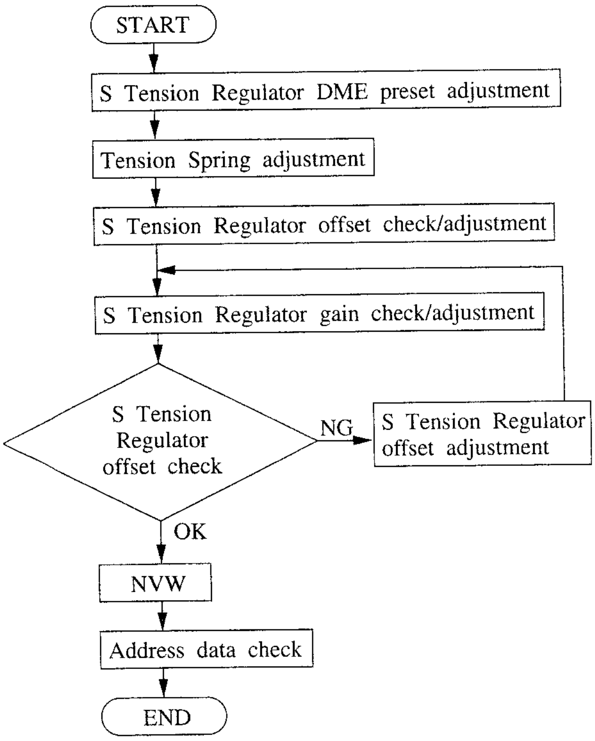
6-9-3. S Side Tape Tension Adjustment

Basic Knowledge

A. This adjustment is necessary when the S Tension Regulator Ass'y is dismounted or replaced.

B. Prepare the following tools.
- S Tension Regulator Adjustment Tool
  Sony Parts No.: J-6257-350-A

C. Adjustment flowchart


START
S Tension Regulator DME preset adjustment
Tension Spring adjustment
S Tension Regulator offset check/adjustment
S Tension Regulator gain check/adjustment
S Tension Regulator offset check
NG
S Tension Regulator offset adjustment
OK
NVW
Address data check
END

NOTE:
After carring out 1. Step (2), the following WARNING MESSAGE is displayed on the Display.

[NO CASSETTE COMPARTMENT MODE]
S72-2 of SSP/SP board is switched ON

Turn S72 bit2 of switch to OFF after the adjustment, and the WARNING MESSAGE disappears on the Display.

This message is indicated on the display of the VTR that the ROM software versions on the SSP-07 Board are highet than 6.0 versions.

1. Adjustment Preparation
   1. (1) Cassette Compartment Ass'y removal
      Refer to Section 6-5.
   2. (2) Set bit 2 of the S72 of the SSP-07 Board to ON. (Fig. 6-9-15)
   3. (3) Connect the SSP-07 Board through the Extension Board (EX-341/341A).
   4. (4) Connect an oscilloscope as illustrated. (Fig.6-9-16)

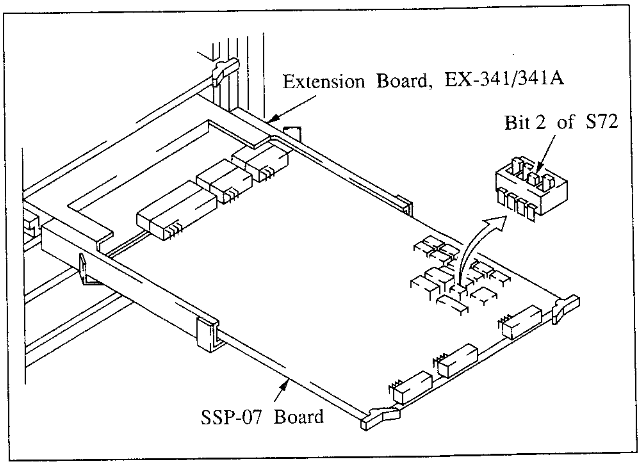

Extension Board, EX-341/341A
Bit 2 of S72
SSP-07 Board

Fig. 6-9-15 Preparation for Adjustment (1)

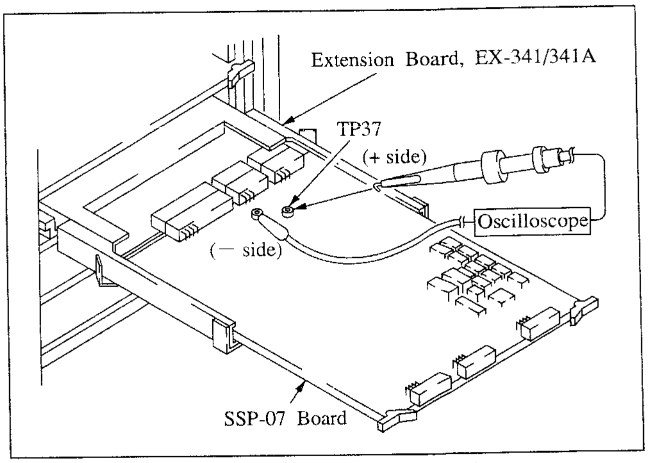

Extension Board, EX-341/341A
TP37
(+ side)
Oscilloscope
(− side)
SSP-07 Board

Fig. 6-9-16 Preparation for Adjustment (2)

(5) Set the Ass'y to the threading-end state without the Cassette Compartment by pressing keys on the control panel in the following sequence.

[BKDV-101]
TEST , F6 (CHECKER), F1 (SP)
F6 (F), 2 , 5 , SET
Keep pressing the < key until the Ass'y reaches the threading-end state.

[BKDV-200 series]
① SHIFT + SET UP
② ENTRY + center key + search dial (or V key) to enter the <TEST> menu.
Turn the search dial clockwise or press V key to select 807. [CHECKER MODE.]
③ Press the > key to move the cursor to EXECTE.
④ Press the Λ key to enter CHECKER mode.
⑤ Enter F25 by pressing the monitor select keys in the following sequence.
(Refer to page 6-1 (1).)
INPUT CHECK + 5 (F), 2, 5, SET
F can be input by selecting it the search dial and F1 (ALPH SEL) key as well.
⑥ Keep pressing the < key until the Ass'y reaches the threading-end state.

2. S Tension Regulator DME preset adjustment (Fig. 6-9-17)
(1) Set the Position Adjustment Tool as illustrated.
(2) Make sure that the voltage satisfies the specification after step (1).

Specification : 0 ± 20mV

If the specification is satisfied, take the procedure from step (4).
If it is not satisfied, take the procedure from step (3).
(3) Satisfy the specification by loosening the two screws of the DET-19 Board shown in the figure and moving the DET-19 Board toward the direction of the arrow. (Fig. 6-9-17, Fig. A)
(4) Tighten the two screws and apply a small amount of locking compound (Screw lock) to the heads of the screws.
(5) Dismount the Positon Adjustment Tool.

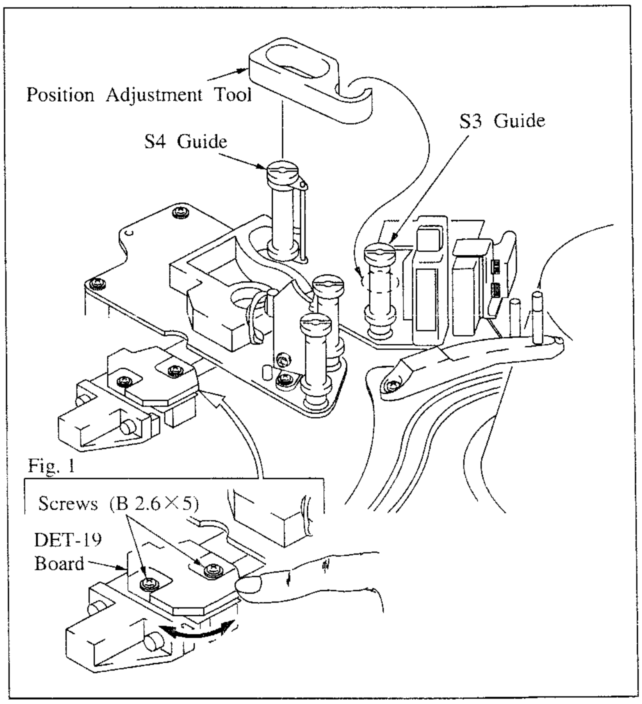


Fig. 6-9-17 S Tension Regulator DME Preset Adjustment

3. Tool installation

Note : Turn off the power before mounting the tool.
Turn on the power after mounting it.

(1) Disconnect connector CN314 shown in the figure. (Fig. 6-9-18)

(2) Remove the screw which fixes the PC-63 Board and dismount the board.

(3) Remove the two screws which fix the Tape Protector (S) and dismount the Tape Protector.

Note : Work carefully without dropping screws into the machine.

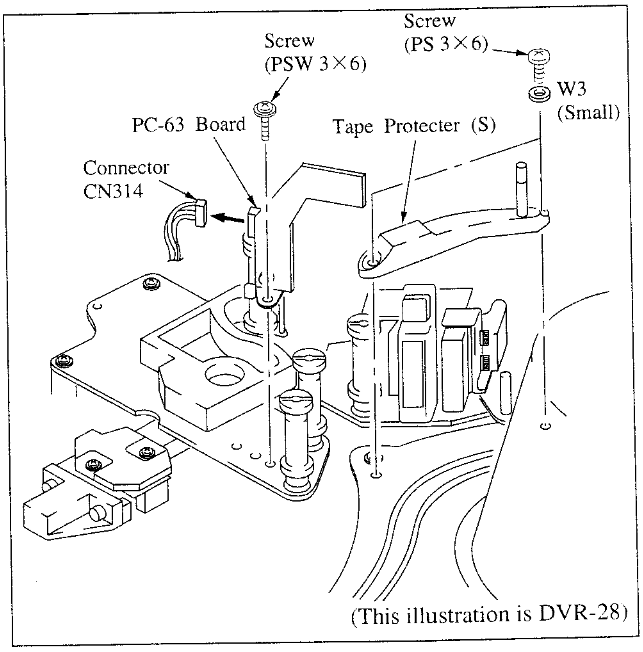

Screw
(PS 3×6)
Screw
(PSW 3×6)
W3
(Small)
PC-63 Board
Tape Protecter (S)
Connector
CN314
(This illustration is DVR-28)

Fig. 6-9-18 Tool Installation (1)

(4) Install the Adjustment Plate Ass'y and Tape Setting (Tools) as shown in Fig. 6-9-19.
When installing the Adjustment Plate Ass'y, use the screw installed the PC-63 Board.

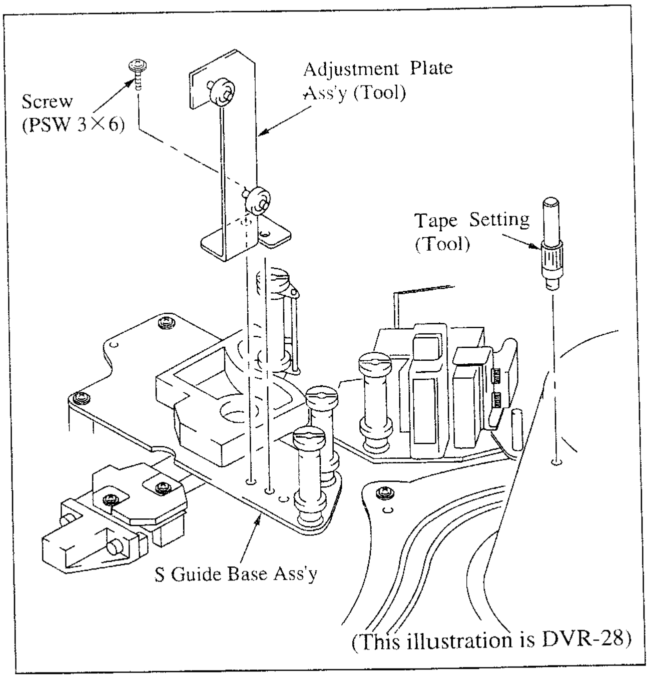

Adjustment Plate
Ass'y (Tool)
Screw
(PSW 3×6)
Tape Setting
(Tool)
S Guide Base Ass'y
(This illustration is DVR-28)

Fig. 6-9-19 Tool Installation (2)

4. Tension Spring adjustment
   (1) Set the Tension Measuring Tape as illustrated and suspend the Weight (55g). (Fig. 6-9-20)
   (2) Make sure that the voltage of TP37 on the SSP-07 Board satisfies the specification after step 1.

   Specification: 0 ± 20mV

   If the specification is satisfied, take the procedure from step (4).
   If it is not satisfied, take the procedure from step (3).
   (3) Satisfy the specification by loosening the adjusting screw shown in the figure and moving the Spring Blaket in the arrow direction. (Fig. 6-9-20, Fig. A)
   (4) Tighten the adjusting screw.

5. Restore the SSP-07 Board to the original state by reversing the procedure of step 1 (3) and (4).

6. S Tension Regulator offset check/adjustment.
   (1) Press keys on the control panel in the following sequence.

   [BKDV-101]
   TEST , F6 (CHECKER)
   F2 (SV)
   F3 (C), 2 , 8 , SET

   [BKDV-200 series]
   ① SHIFT + SET UP
   ② ENTRY + center key + search dial (or ∨ key) to enter the <TEST> menu.
   Turn the search dial clockwise or press ∨ key to select 807. [CHECKER MODE.]
   ③ Press the > key to move the cursor to EXECTE.
   ④ Press the ∧ key to enter CHECKER mode.
   SHIFT , F3 (BOARD) (Change to SV mode)
   ⑤ Enter C28 by pressing the monitor select key.
   INPUT CHECK + 2 (C), 2, 8, SET

   C can be input by selecting it the search dial and F1 (ALPH SEL) key as well.
   Display the output value on the display. (Fig. 6-9-21)

   (2) Make sure that part a in Fig. 6-9-21 satisfies the specification.

   Specification: 54 ± 1 (HEX)

   If the specification is satisfied, take the procedure from step (4).
   If it is not satisfied, take the procedure from step (3).

Fig. A

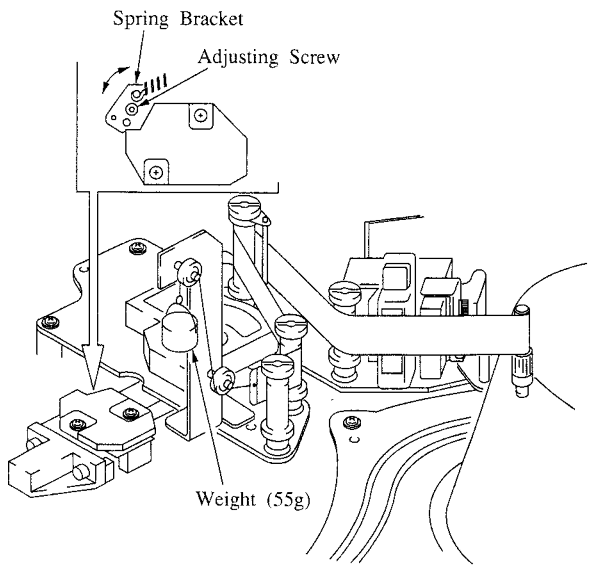
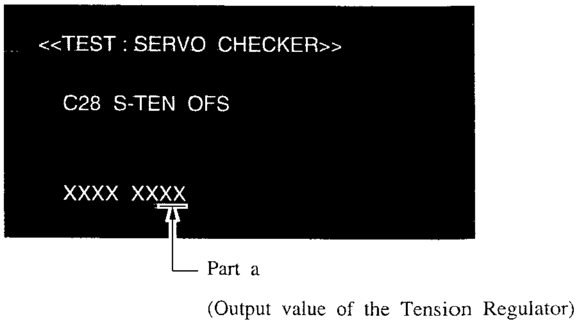


Fig. 6-9-20 Tension Spring Adjustment



```
<<TEST : SERVO CHECKER>>

C28 S-TEN OFS


XXXX XXXX
```

(Output value of the Tension Regulator)

Fig. 6-9-21 S Tension Regulator Offset Check (on the Display of BKDV-101)

(3) Satisfy the specification by pressing the [<] [>] keys on the control panel.
(4) After making the adjustment, press the following key.

[BKDV-101] [SET]

[BKDV-200 series] [SET] of the monitor select key

(5) Hit the * part of the S4 Guide shown in Fig.6-9-22 lightly 2 or 3 times. Make sure that the specification of step (2) is satisfied. If it is not satisfied, repeat the procedure from step (3).

7. Remove the Weight (55g) and the Tension Measurement Tape which were set in step 4 (1).

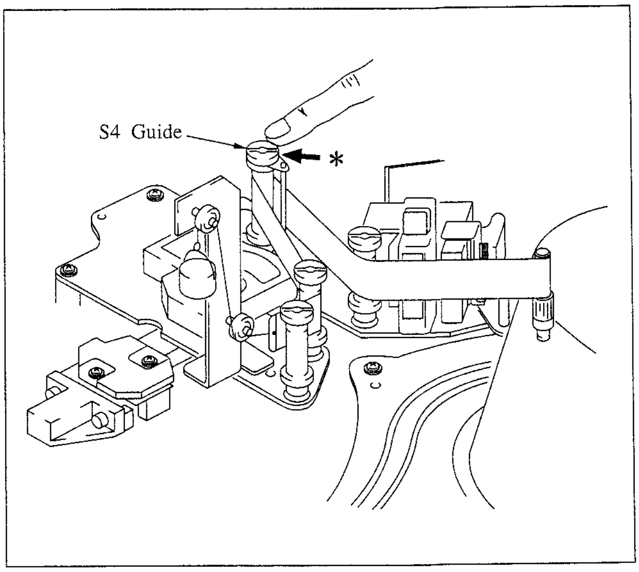


Fig. 6-9-22 S Tension Regulator Offset Adjustment

8. S Tension Regulator gain check/adjustment
(1) Press keys on the control panel in the following sequence.

[BKDV-101]
[F3] (C), [2] , [9] , [SET]

[BKDV-200 series]
Entry C29 pressing the monitor select keys.
[INPUT CHECK] + [2] (C), [2], [9], [SET]

C can be input by selecting it the search dial and [F1] (ALPH SEL) key as well.
Display the output value on the display. (Fig. 6-9-23)

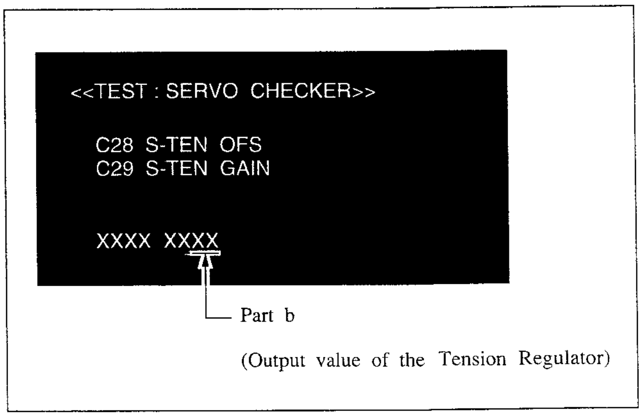
(2) Make sure that part b in Fig. 6-9-23 satisfies the specification.

Specification : 0F ± 1 (HEX)

If the specification is satisfied, take the procedure from step (4).
If it is not satisfied, take the procedure from step (3).
(3) Satisfy the specification by pressing the [<] [>] keys on the control panel.
(4) After making the adjustment, press the following key.

[BKDV-101] [SET]

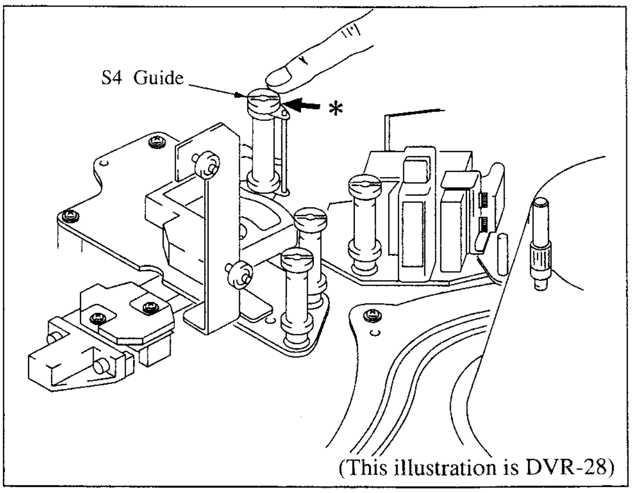
[BKDV-200 series] [SET] of the monitor select key



```
<<TEST : SERVO CHECKER>>

  C28 S-TEN OFS
  C29 S-TEN GAIN


  XXXX XXXX
```

Fig. 6-9-23 S Tension Regulator Gain Check (on the Display of BKDV-101)

(5) Hit the * part of the S4 Guide shown in Fig. 6-9-24 lightly 2 or 3 times. Make sure that the specification of step (2) is satisfied. If it is not satisfied, repeat the procedure from step (3).



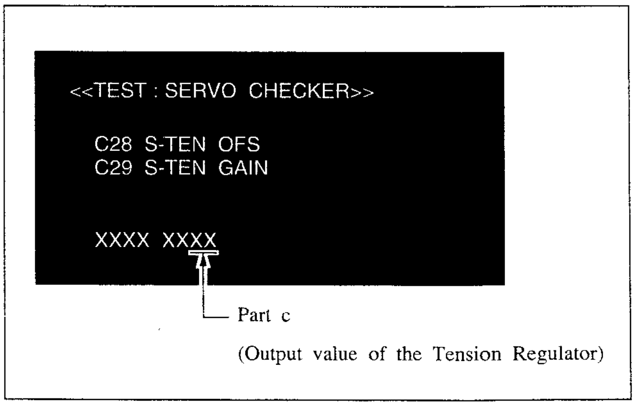
(This illustration is DVR-28)

Fig. 6-9-24 S Tension Regulator Gain Adjustment

9. S Tension Regulator offset check
   (1) Set the Tension Measuring Tape and the Weight (55 g) which were removed in step 7.
   (2) Make sure that part c in Fig. 6-9-25 satisfies the specification.

   Specification : 54 ± 1 (HEX)

   If the specification is satisfied, take the procedure from step 10.
   If it is not satisfied, take the procedure from step 6.



```
<<TEST : SERVO CHECKER>>

  C28 S-TEN OFS
  C29 S-TEN GAIN


  XXXX XXXX
```

(Output value of the Tension Regulator)

Fig. 6-9-25 S Tension Regulator Offset Check (on the Display of BKDV-101)

10. NVW
    (1) Press keys on the control panel in the following sequence.

    [BKDV-101]
    F12 (EXIT), F1 (SP), F10 (NVW)
    Keep pressing the / key until "PUSH NVWR SW" is shown on the display.

    [BKDV-200 series]
    ① Return to the SP CHECKER mode by pressing F3 (BOARD) twice.
    ② Exit from the SHIFT mode by pressing SHIFT .
    ③ F4 (NVW)
    ④ SET of the monitor select key.
    ⑤ Keep pressing the F3 (/) key until "PUSH NVWR SW" is shown on the display.

    (2) Press S71(NVWR SW) of the SSP-07 Board.
    Make sure that "READY" is shown on the display.

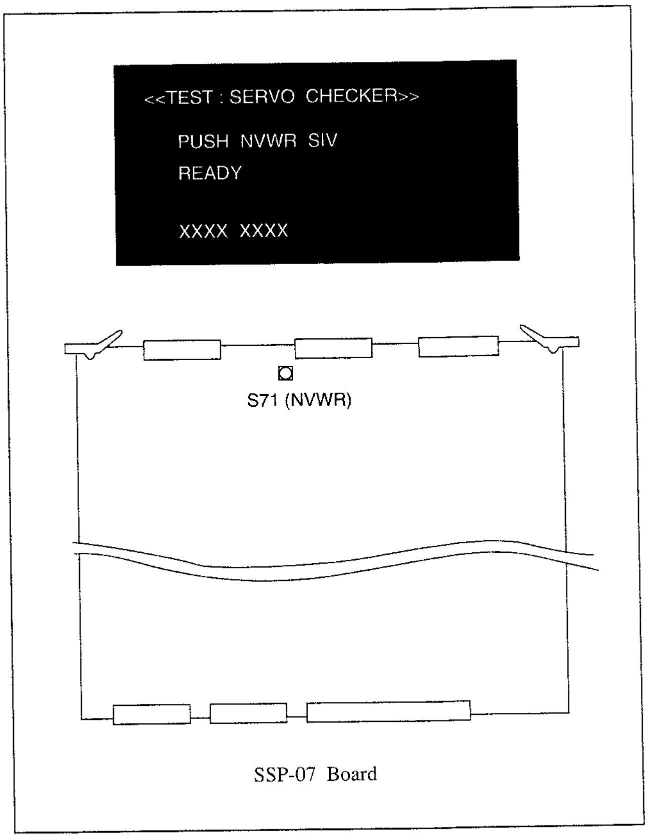
11. Turn off the power.

12. Remove the Weight (55 g) and the Tension Measuring Tape by taking the step 7 procedure.

13. Dismount tools by reversing the step 3 procedure.

14. Set bit 2 of the S72 of the SSP-07 Board to OFF.

15. Cassette Compartment Ass'y installation
    Refer to Section 6-5.



```
<<TEST : SERVO CHECKER>>
  PUSH NVWR SW
  READY

  XXXX XXXX
```

Fig. 6-9-26 NVW

6-10. REPLACEMENT OF S GUIDE BASE ASS'Y COMPONENT PARTS

Basic Knowledge

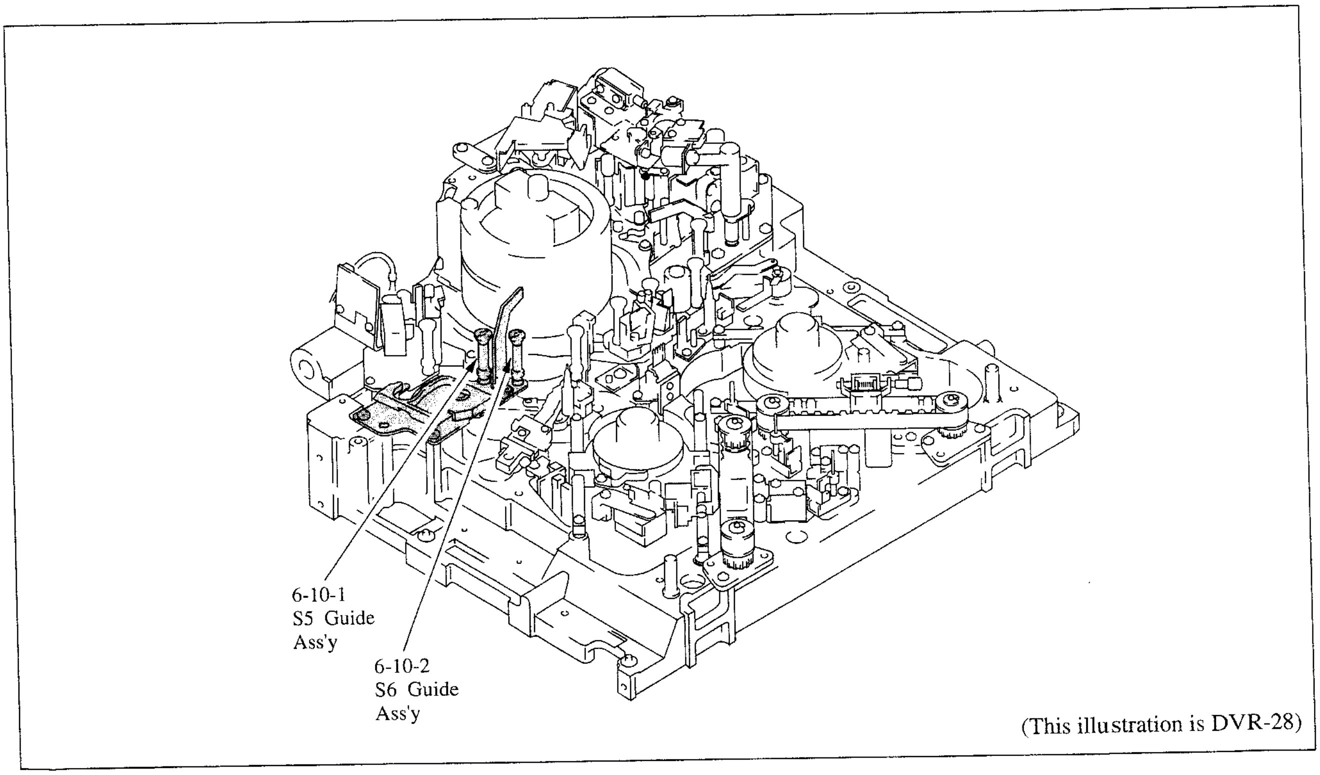
A. The S Guide Base Ass'y is the block shown in Fig. 6-10-1. This section is concerned with the following component parts of the S Guide Base Ass'y.
6-10-1. S5 Guide Ass'y Replacement
6-10-2. S6 Guide Ass'y Replacement

B. The shape of the part of the S Guide Base Ass'y varies with the serial numbers of the units. But the replacement procedures are all the same.
[The Difference of the Part]
The RG Spaced Fix Shaft of the S5 Guide is short.

Applicable Serial Numbers

DVR-28 (UC)	S/N	12101 and higher
DVR-28P (UC)	S/N	11201 and higher
DVR-28P (EK)	S/N	11701 and higher

C. Prepare the following tools for replacement or adjustment.
- Reference Plate (28) : DM-739
  Sony Parts No. : J-6257-390-A
- Cleaning Piece
  Sony Parts No. : 2-034-697-00
- Cleaning Liquid (or equivalent)
  Sony Parts No. : 9-919-573-00
- Thickness Gauge
  Sony Parts No. : J-6041-670-A
- Reel Table Hight Adjustment Tool : JB-5219B
  Sony Parts No. : J-6252-190-B



(This illustration is DVR-28)

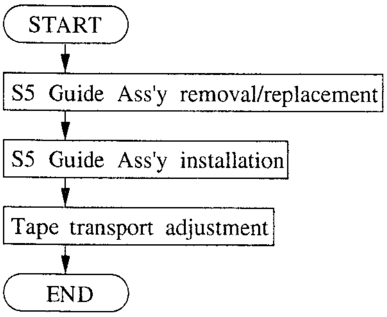
Fig. 6-10-1 S Guide Ass'y

6-10-1. S5 Guide Ass'y Replacement

Basic Knowledge

A. Refer to Basic Knowledge in Section 6-10. before replacement or adjustment.

B. Replacement flow chart


START
S5 Guide Ass'y removal/replacement
S5 Guide Ass'y installation
Tape transport adjustment
END

Replacement

1. S5 Guide Ass'y removal (Fig. 6-10-2)
   (1) Dismount the flange holder shown in the figure and dismount the component parts of the S5 Guide Ass'y.

   Note: The set screw is used to adjust the S5 Guide height. The height has already been adjusted. Do not turn it unless necessary.

   (2) Replace the component parts that must be replaced.

2. S5 Guide Ass'y removal
   (1) Clean the roller guide shaft with a cleaning piece soaked with cleaning liquid.
   (2) Clean the edges of the S5 Guide Ass'y with a cleaning piece soaked with cleaning liquid.
   Be sure to wipe with a dry cloth twice or three times after cleaning.
   (3) Mount the components by reversing the step 2 procedure.

   Note: If you replaced the set screw, tighten it leaving 1 to 1.5 threads from the upper edge of the flange holder.
   When install the S Flange Shim, Flange and Roller Guide, take case of their directions.

3. Clean the outer surfaces of the S5 Guide.

Adjustment

4. Tape transport adjustment
   Refer to Section 9.

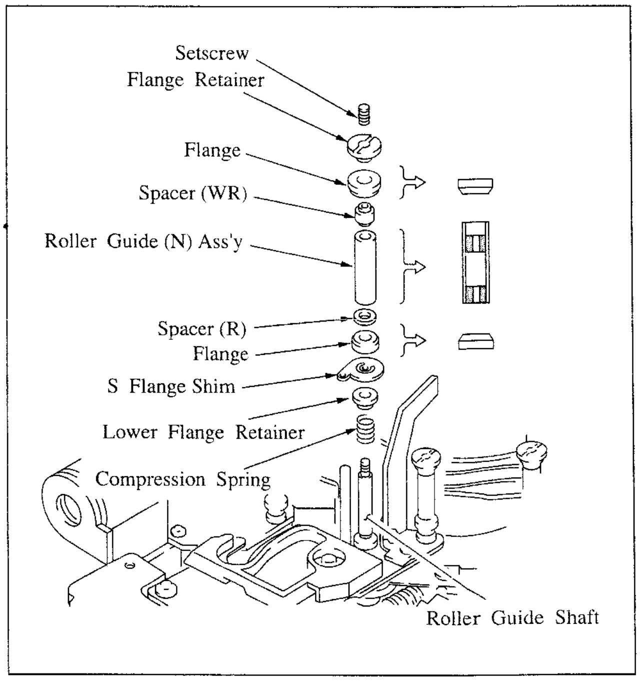

Setscrew
Flange Retainer
Flange
Spacer (WR)
Roller Guide (N) Ass'y
Spacer (R)
Flange
S Flange Shim
Lower Flange Retainer
Compression Spring
Roller Guide Shaft

Fig. 6-10-2 S5 Guide Ass'y Removal

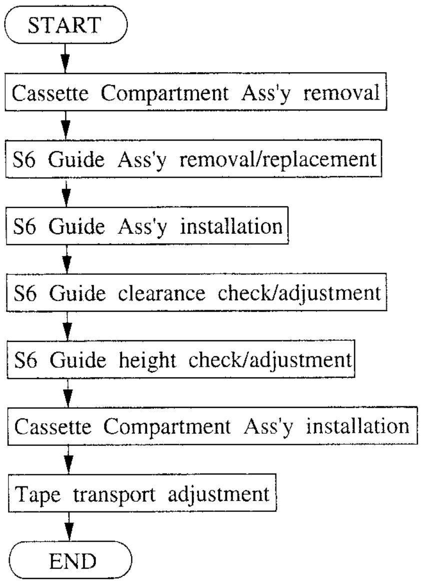
6-10-2. S6 Guide Ass'y Replacement

Basic Knowledge

A. Dismount the Cassette Compartment Ass'y before replacing the S6 Guide Ass'y.

B. Refer to Basic Knowledge in Section 6-10. before replacement or adjustment.

C. Replacement flow chart


START
Cassette Compartment Ass'y removal
S6 Guide Ass'y removal/replacement
S6 Guide Ass'y installation
S6 Guide clearance check/adjustment
S6 Guide height check/adjustment
Cassette Compartment Ass'y installation
Tape transport adjustment
END

Replacement

1. Cassette Compartment Ass'y removal
   Refer to Section 6-5.

2. S6 Guide Ass'y removal (Fig. 6-10-3)
   (1) Dismount the flange holder shown in the figure and dismount the component parts of the S6 Guide Ass'y.

   Note: The set screw is used to adjust the S6 Guide height. The height has already been adjusted. Do not turn it unless necessary.

   (2) Replace the component parts that must be replaced.

3. S6 Guide Ass'y installation
   (1) Clean the roller guide shaft with a cleaning piece soaked with cleaning liquid.
   (2) Clean the edges of the S6 Guide Ass'y with a cleaning piece soaked with cleaning liquid.
   Be sure to wipe with a dry cloth twice or three times after cleaning.
   (3) Mount the components by reversing the step 2 procedure.

   Note: If you replaced the set screw, tighten it leaving 1 to 1.5 threads from the upper edge of the flange holder.

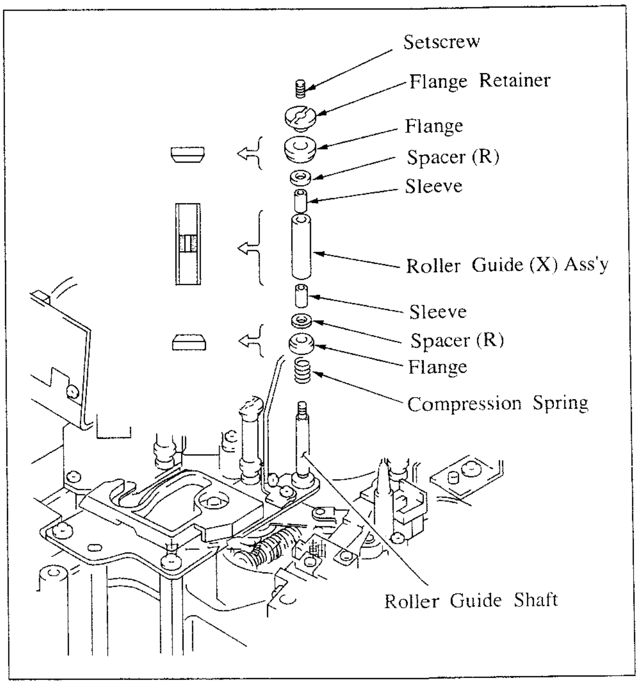

Setscrew
Flange Retainer
Flange
Spacer (R)
Sleeve
Roller Guide (X) Ass'y
Sleeve
Spacer (R)
Flange
Compression Spring
Roller Guide Shaft

Fig. 6-10-3 S6 Guide Ass'y Removal

Adjustment

4. S6 Guide clearance check/adjustment

S6 Guide clearance check (Fig. 6-10-4)

(1) Tilt the Roller Guide (X) Ass'y in the A direction. Using a thickness gauge, make sure that the clearances a and b are within the Specification.

Specification : $0.03\ \text{mm} \leqq a \leqq 0.15\ \text{mm}$
$0.03\ \text{mm} \leqq b \leqq 0.15\ \text{mm}$

If the Specification are not satisfied, make the following adjustment.

S6 Guide clearance adjustment (Fig. 6-10-4)

If the clearance is large (larger than 0.15 mm) :

(2) Disassemble the S6 Guide Ass'y and replace the aligning sleeve in the side of the larger clearance.

If the clearance is small (smaller than 0.03 mm) :

(3) Disassemble the S6 Guide Ass'y and insert 1 or 2 spacers in the side of the smaller clearance.

(4) Check the clearances again by repeating step (1). If the standards are not satisfied, repeat step (2) or (3).

(5) After completion of adjustment, clean the outer surfaces of the Roller Guide (X) Ass'y with a cleaning piece soaked with cleaning liquid. Be sure to wipe with a dry cloth twice or three times after cleaning.

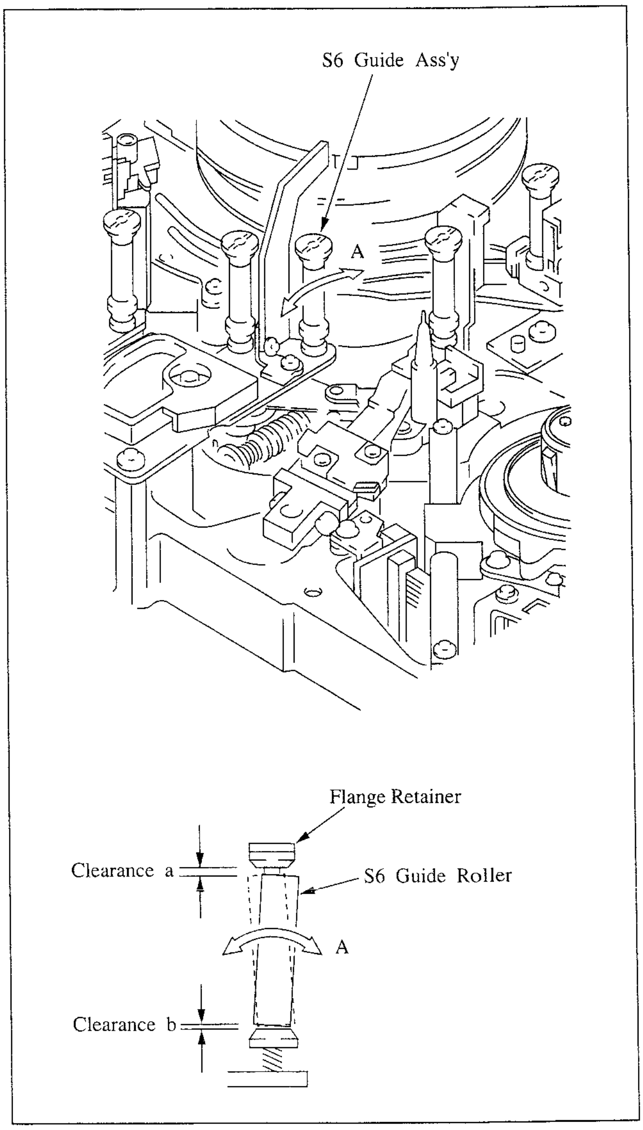


Fig. 6-10-4 S6 Guide Clearance Check/Adjustment

5. S6 Guide height check/adjustment

Preparation

Clean the mounting surfaces of a reference plate and a base plate and the adjusting surface of a reel table height adjustment tool with a cloth soaked with cleaning liquid.

S6 Guide height check (Fig. 6-10-5)

(1) Set the reference plate and the reel table height adjustment tool on the machine.

Note: When the reference plate is set, the reel base must be set at the M or L cassette position. Set the reel position by referring to Basic Knowledge C of Section 6-7.

(2) Put the reel table height adjustment tool against the S6 Guide and check to see if the part a (clearance between the lower flange and the tool) satisfies the standard.
Specification : There should be no clearance at the part
If the Specification is not satisfied, make the following adjustment.

S6 Guide height adjustment (Fig. 6-10-5)

(3) Loosen the set screw shown in the figure and turn the flange holder until the Specification is satisfied.
Use a 1.5 mm hexagonal wrench screw driver.

(4) Tighten the set screw and repeat step (2).
Tightened Torque: 58.8×10^{-2} N·m (6 kgf·cm)

(5) When the Specification is satisfied, remove the reference plate and the reel table height adjustment tool from the machine.

6. Cassette Compartment installation
Refer to Section 6-5.

7. Tape transport adjustment
Refer to Section 9.

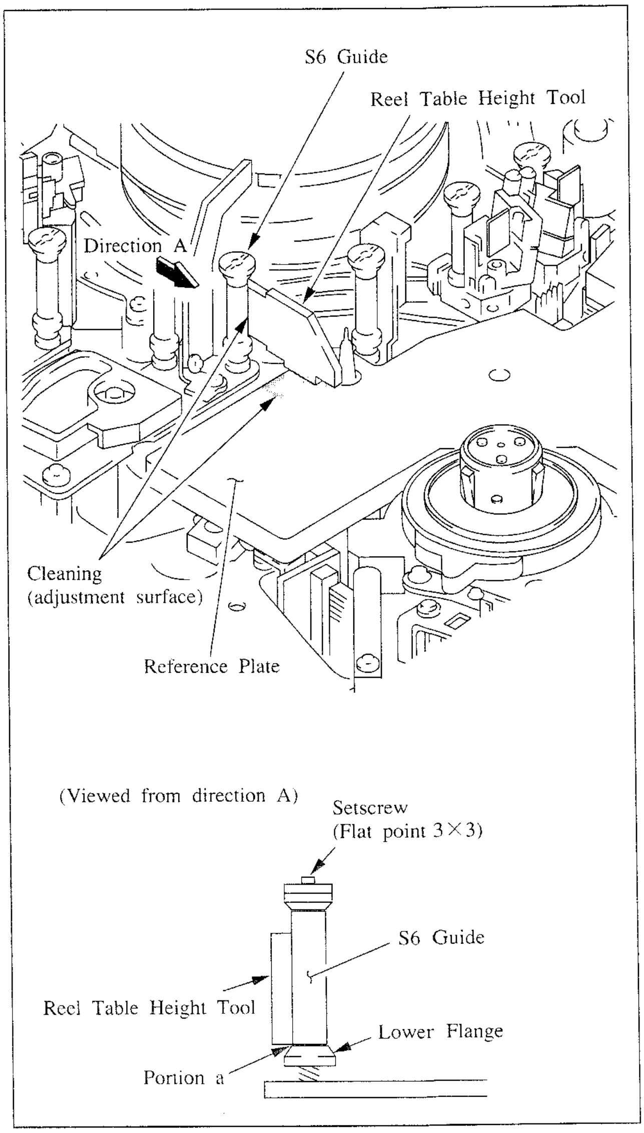

S6 Guide
Reel Table Height Tool
Direction A
Cleaning
(adjustment surface)
Reference Plate
(Viewed from direction A)
Setscrew
(Flat point 3×3)
S6 Guide
Reel Table Height Tool
Lower Flange
Portion a

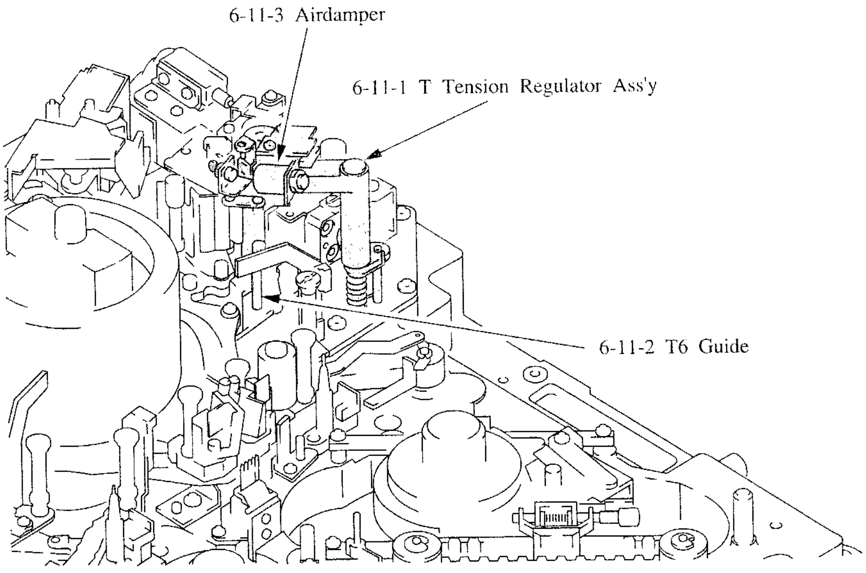
Fig. 6-10-5 S6 Guide Height Check/Adjustment

6-11. REPLACEMENT OF T TENSION REGULATOR ASS'Y

Basic Knowledge

A. The T Tension Regulator Ass'y is shown in Fig. 6-11-1. This section is concerned with the following component parts of the T Tension Regulator Ass'y.
   6-11-1. T Tension Regulator Ass'y Replacement
   6-11-2. T6 Guide Replacement
   6-11-3. Air Damper Replacement
   6-11-4. T Side Tape Tension Adjustment

B. Prepare the following tools for replacement and adjustment.
   - Cleaning Liquid (or equivalent)
     Sony Parts No.: 9-919-573-00
   - Cleaning Piece
     Sony Parts No.: 2-034-697-00
   - Reference Plate (28): DM-739
     Sony Parts No.: J-6257-390-A
   - Reel Table Hight Adjustment Tool: JB-5219B
     Sony Parts No.: J-6252-190-B
   - Thickness Gauge
     Sony Parts No.: J-6041-670-A
   - Wire Gauge
     Sony Parts No.: J-6152-450-A



(This illustration is DVR-28)

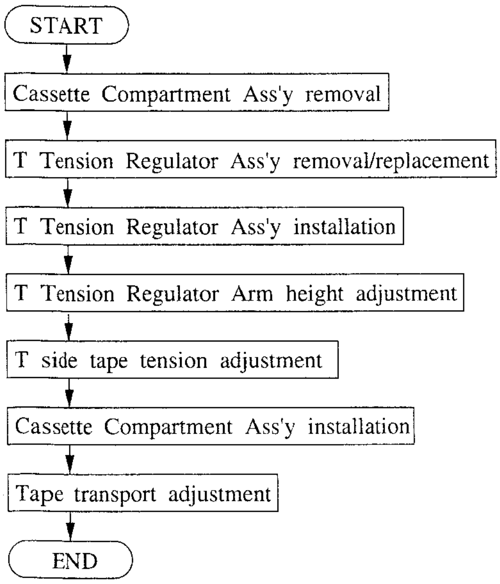
Fig. 6-11-1 T Tension Regulator Ass'y

6-11-1. T Tension Regulator Ass'y Replacement

Basic Knowledge

A. Dismount the Cassette Compartment Ass'y before replacing the T Tension Regulator Ass'y.

B. Replacement flow chart


START
Cassette Compartment Ass'y removal
T Tension Regulator Ass'y removal/replacement
T Tension Regulator Ass'y installation
T Tension Regulator Arm height adjustment
T side tape tension adjustment
Cassette Compartment Ass'y installation
Tape transport adjustment
END

Replacement

1. Cassette Compartment Ass'y removal
   Refer to Section 6-5.

2. T Tension Regulator Ass'y removal (Fig.6-11-2)
   (1) Remove the connector CN339 from the DET-18 Circuit Board shown in the figure.
   (2) Remove the screw which fixes the T Tension Regulator Ass'y and dismount the T Tension Regulator Ass'y.

   Note: The set screw of the screw already controls the height of the Tension Regulator. Therefore, do not turn it unless necessary.

   (3) The spring shown in the figure will also come off when the T Tension Requlator is dismounted.
   Replace it if necessary.

3. T Tension Regulator installation
   (1) Clean the shaft shown in the figure with cloth moistened with cleaning liquid.
   (2) Mount the T Tension Regulator Ass'y by reversing the step 2 procedures.

   Note: Make sure that the hook of the spring is in the right position.

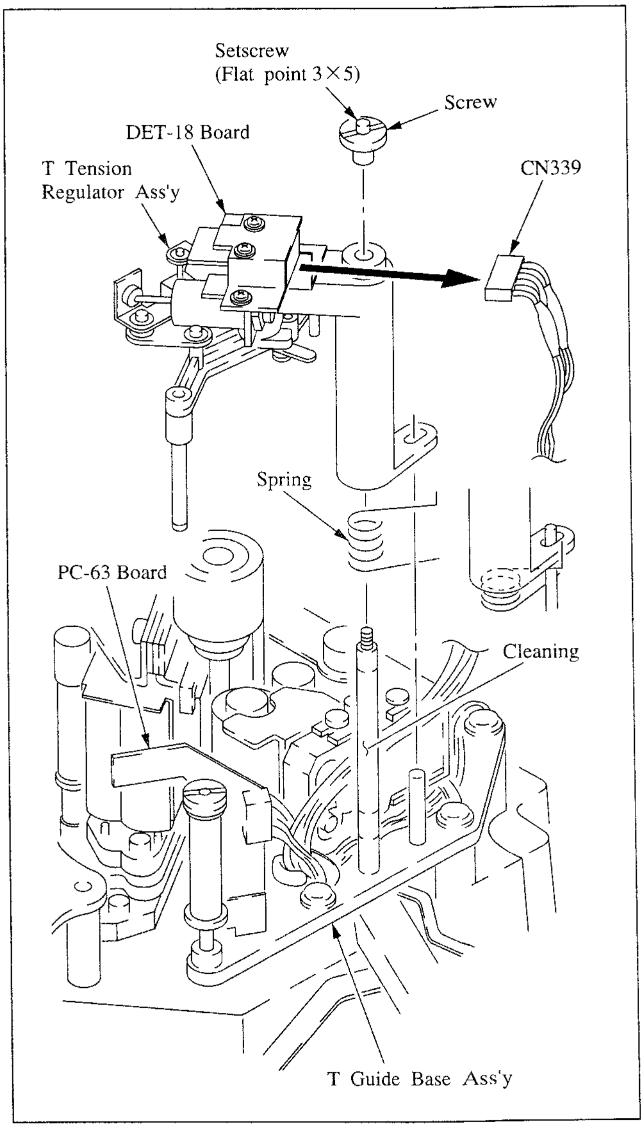

Setscrew
(Flat point 3×5)
Screw
DET-18 Board
T Tension
Regulator Ass'y
CN339
Spring
PC-63 Board
Cleaning
T Guide Base Ass'y

Fig. 6-11-2 T Tension Regulator Ass'y Removal

Adjustment

4. T Tension Regulator Arm height adjustment

Preparation

① Clean the mount surfaces of the reference plate and the base plate and the adjusting surface of the reel table height tool with cloth which is moistened with cleaning liquid. Set the tool.

② Before checking, remove the PC-63 Board from the T guide Base. After checking and adjusting, reinstall the PC-63 Board.

Check

(1) Set the reference plate on the machine.
Then, place a 0.09 mm thickness gauge on the reference plate and set the reel table height adjustment tool.

Note: When the reference plate is set, the reel table must be set at the M or L cassette position.
Set the reel position by referring to Basic Knowledge in Section 6-7.

(2) Place the reel table height adjustment tool against the T Tension Regulator Arm and make sure that part "a" satisfies the specification.

Specification: There should be no clearance at part "a".

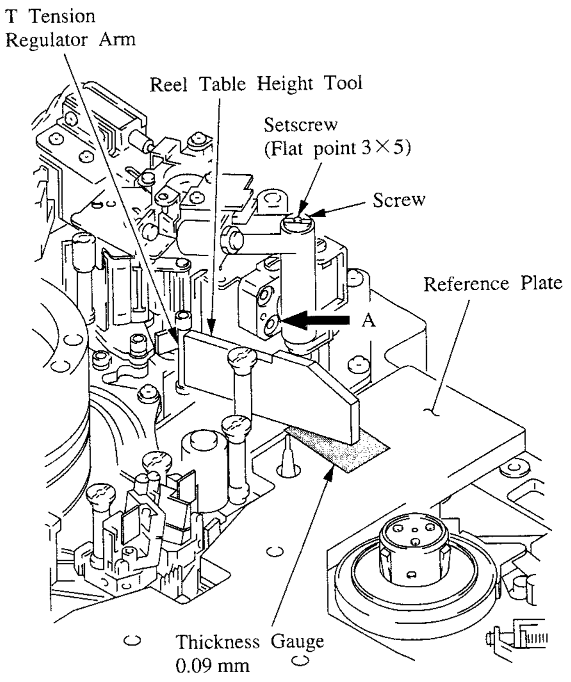
If the specification is not satisfied, make the following adjustment.

Adjustment

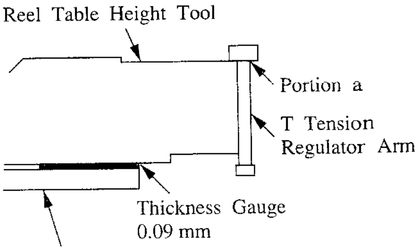
(3) Loosen the set screw shown in the illustration and turn the screw until the specification is satisfied.
Use a hexagonal wrench screw driver (1.5mm in flat across).

(4) Tighten the set screw and repeat the step (2).
Tightened Torgue: 58.8×10^{-2} N·m (6kgf·cm)

(5) Remove the reference plate, the thickness gauge and the reel table height adjustment tool from the machine.


T Tension
Regulator Arm
Reel Table Height Tool
Setscrew
(Flat point 3×5)
Screw
Reference Plate
A
Thickness Gauge
0.09 mm

(Viewed from direction A)


Reel Table Height Tool
Portion a
T Tension
Regulator Arm
Thickness Gauge
0.09 mm
Reference Plate

(This illustration is DVR-28)

Fig. 6-11-3 T Tension Regulator Arm Height Adjustment

5. T side tape tension adjustment
Refer to Section 6-11-4.

6. Cassette Compartment installation
Refer to Section 6-5.

7. Tape transport adjustment
Refer to Section 9.

6-11-2. T6 Guide replacement

Basic Knowledge

A. The T6 Guide (T Tension Regulator Arm) is one of the component parts of the T Tension Regulator Ass'y. The method of replacing the T6 Guide is explained here.

B. Dismount the Cassette Compartment Ass'y before replacing the T Tension Regulator Ass'y.

C. Replacement flow chart

START
↓
Cassette Compartment Ass'y removal
↓
T Tension Regulator Ass'y removal
↓
Components removal/replacement
↓
Magnet Holder installation position adjustment
↓
T Tension Regulator Ass'y installation
↓
T Tension Regulator Arm height adjustment
↓
T side tape tension adjustment
↓
Cassette Compartment Ass'y installation
↓
Tape transport adjustment
↓
END

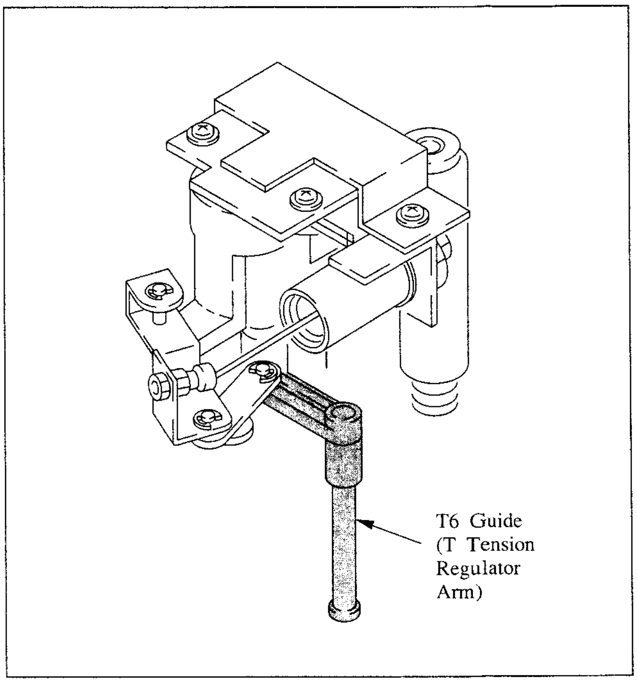


Fig. 6-11-4 T6 Guide

Removal

1. Cassette Compartment Ass'y removal
   Refer to Section 6-5.

2. T Tension Regulator Ass'y removal
   Refer to Section 6-11-1.

3. Components removal (Fig. 6-11-5)
   - The components (Tension Regulator Arm) of the T Tension Regulator can be dismounted by dismounting the parts shown in the figure.

Replacement and adjustment

4. Components replacement
   - Replace the components (Tension Regulator Arm) of the T Tension Regulator which was dismounted in step 3.

Note 1: The springs and the E rings shown in the figure should not be used again after being removed once. Replace them with new parts.

Note 2: When mounting a new tension regulator arm, clean the shaft with a cleaning piece which is moistened with cleaning liquid.

Note 3: If you dismounted the magnet holder assembly shown in Fig. 6-12-5 or moved it by loosening its set screw (B2.6x4) when replacing component parts of the T tension regulator assembly, go to step 5.

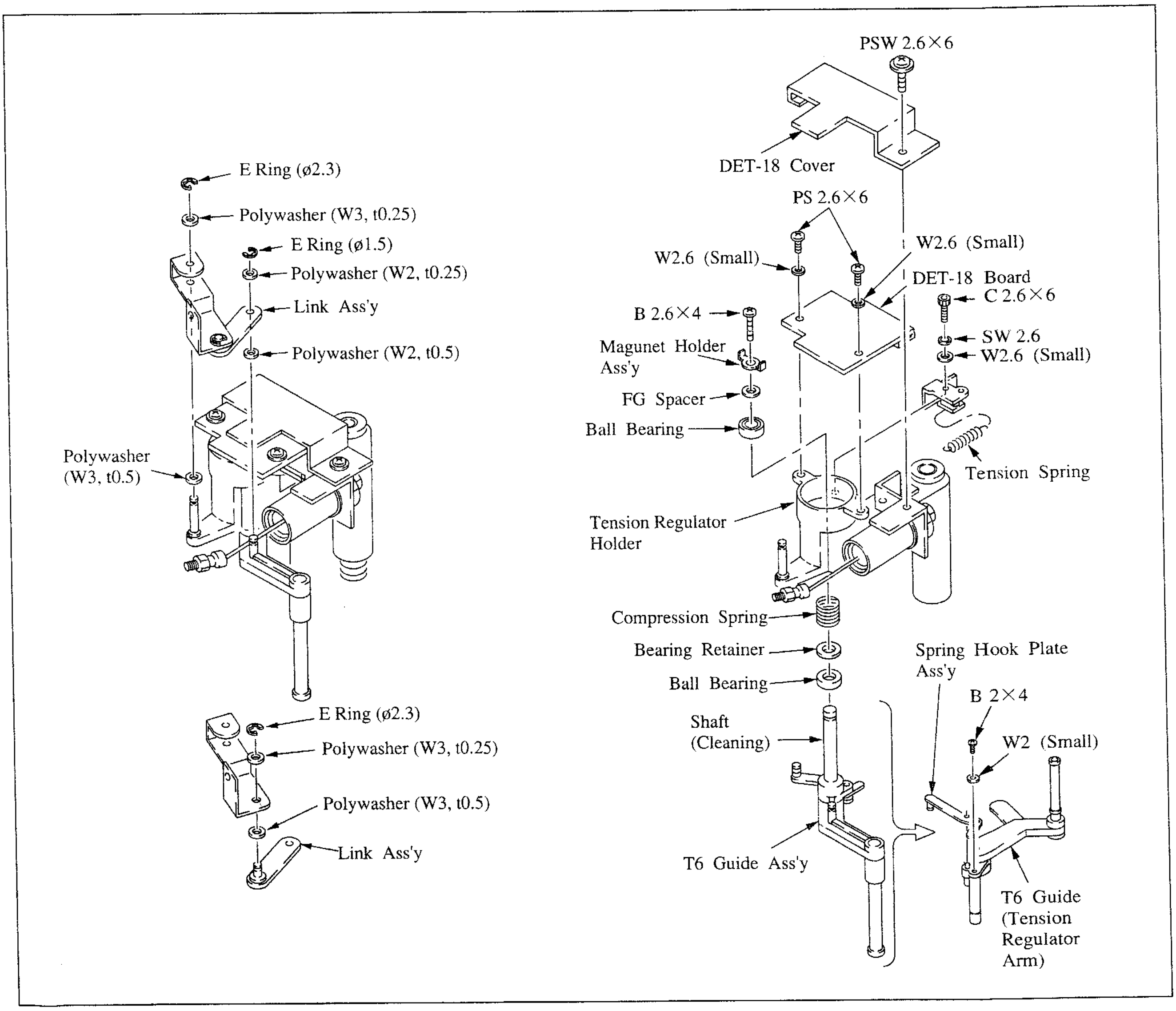

E Ring (ø2.3)
Polywasher (W3, t0.25)
E Ring (ø1.5)
Polywasher (W2, t0.25)
Link Ass'y
Polywasher (W2, t0.5)
Polywasher (W3, t0.5)
E Ring (ø2.3)
Polywasher (W3, t0.25)
Polywasher (W3, t0.5)
Link Ass'y
PSW 2.6×6
DET-18 Cover
PS 2.6×6
W2.6 (Small)
W2.6 (Small)
DET-18 Board
C 2.6×6
B 2.6×4
Magunet Holder Ass'y
SW 2.6
W2.6 (Small)
FG Spacer
Ball Bearing
Tension Spring
Tension Regulator Holder
Compression Spring
Bearing Retainer
Ball Bearing
Spring Hook Plate Ass'y
B 2×4
Shaft (Cleaning)
W2 (Small)
T6 Guide Ass'y
T6 Guide (Tension Regulator Arm)

Fig. 6-11-5 Components Removal

5. Adjusting the magnet holder position.

   ① Tighten the set screw of the magnet holder assembly lightly.

   ② Insert a wire gauge of 1.0 mm (diameter) into the magnet holder positioning hole. (Fig. 6-12-5 (a))

   ③ Press the spring sheet assembly provided at the bottom of the tension regulator against the stopper pin by pushing it in the arrow direction A. Maintain this state. (Fig. 6-12-5 (b))

   ④ Turn the magnet holder assembly in the clockwise direction and press it against the side of the wire gauge. (Fig. 6-12-5 (b) Enlarged Drawing)

   ⑤ Tighten the set screw of the magnet holder assembly.

   ⑥ Pull out the wire gauge.

6. T Tension Regulator Ass'y installation.
   Refer to Section 6-11-1.

   Note: In mounting the T Tension Regulator Ass'y, clean the T6 Guide with a cleaning piece which is moistened with cleaning liquid. After cleaning, be sure to wipe it with dry cloth 2 or 3 times.

7. T Tension Regulator Arm height adjustment
   Refer to Section 6-11-1.

8. T side tape tension adjustment
   Refer to Section 6-11-4.

9. Cassette Compartment Ass'y installation
   Refer to Section 6-5.

10. Tape transport adjustment
    Refer to Section 9.

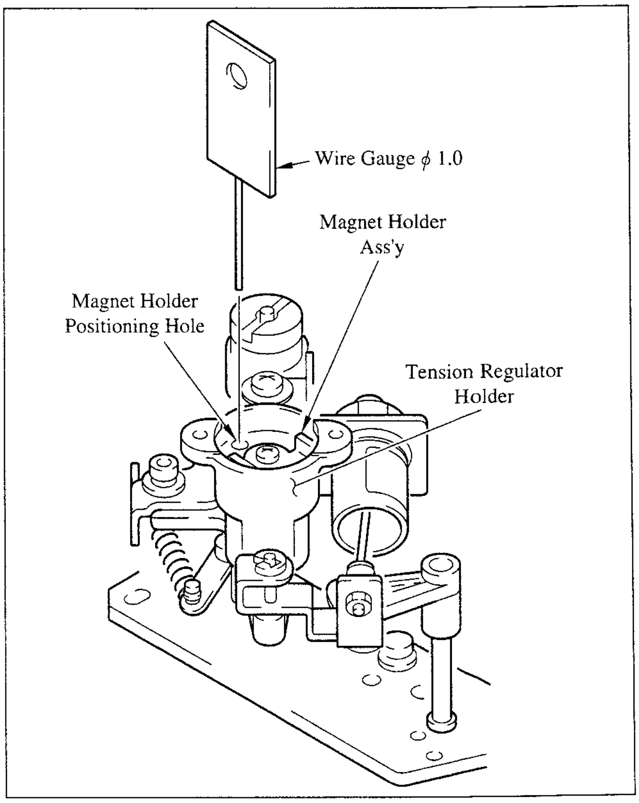

Wire Gauge ϕ 1.0
Magnet Holder Ass'y
Magnet Holder Positioning Hole
Tension Regulator Holder

Fig. 6-11-5 (a) Adjusting the magnet holder position (1)

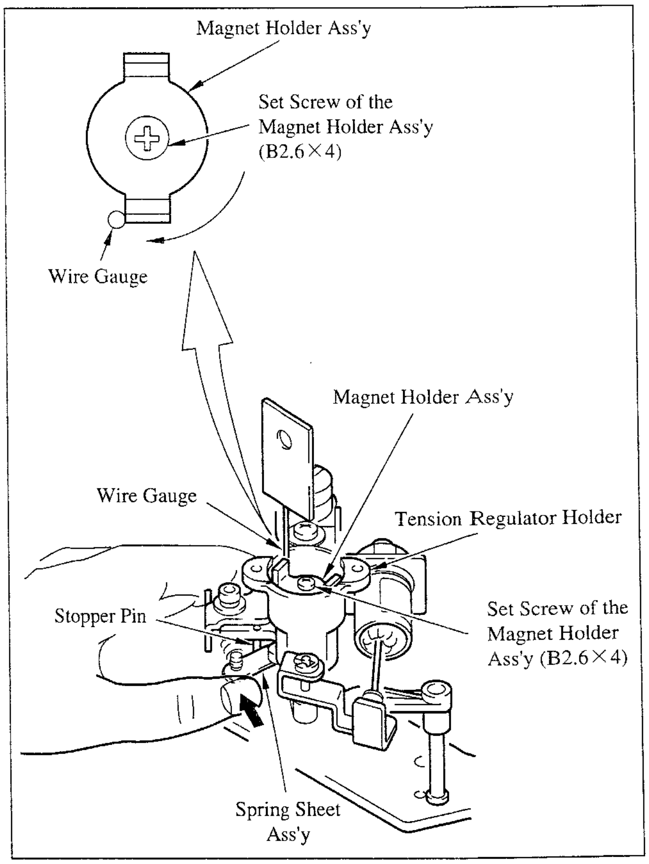

Magnet Holder Ass'y
Set Screw of the Magnet Holder Ass'y (B2.6×4)
Wire Gauge
Magnet Holder Ass'y
Wire Gauge
Tension Regulator Holder
Stopper Pin
Set Screw of the Magnet Holder Ass'y (B2.6×4)
Spring Sheet Ass'y

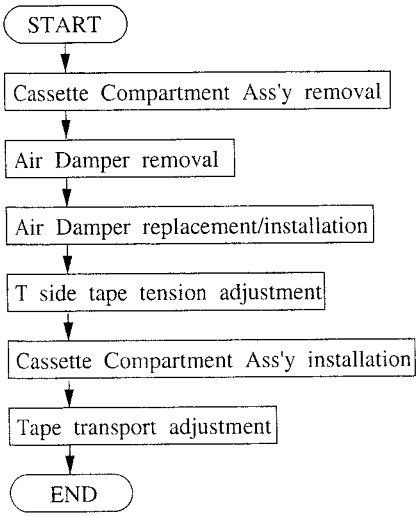
Fig. 6-11-5 (b) Adjusting the magnet holder position (2)

6-11-3. Air Damper Replacement

Basic Knowledge

A. Dismount the Cassette Compartment Ass'y before replacing the Air Damper.

B. Replacement flow chart


START
Cassette Compartment Ass'y removal
Air Damper removal
Air Damper replacement/installation
T side tape tension adjustment
Cassette Compartment Ass'y installation
Tape transport adjustment
END

Removal

1. Cassette Compartment Ass'y removal
   Refer to Section 6-5.

2. Air Damper removal (Fig. 6-11-6)
   (1) Remove the nut which fixes the cylinder rod.
   (2) Dismount the Insulating Plate by removing the screw which fixes the ptate.
   (3) Dismount the Air Damper Block by removing the screw which fixes the block.
   (4) Dismount the Air Damper by removing the nut which locks the Air Damper to the cylinder mount plate.

Replacement and adjustment

3. Air Damper replacement/installation
   - Mount a new Air Damper by reversing the step 2 procedures.

Note 1: When mounting an Air Damper, make sure that the attached washer is in the right direction.
(See the illustration.) (Fig. 6-11-6)

Note 2: Work carefully without pulling out the cylinder rod from the air damper.
If you pull it out by mistake, handle it carefully so that the carbon part at the end of the cylinder rod may not be damaged.

Note 3: Adjust the air damper by turning the damper adjusting screw from the locked state to the loosening direction twice.

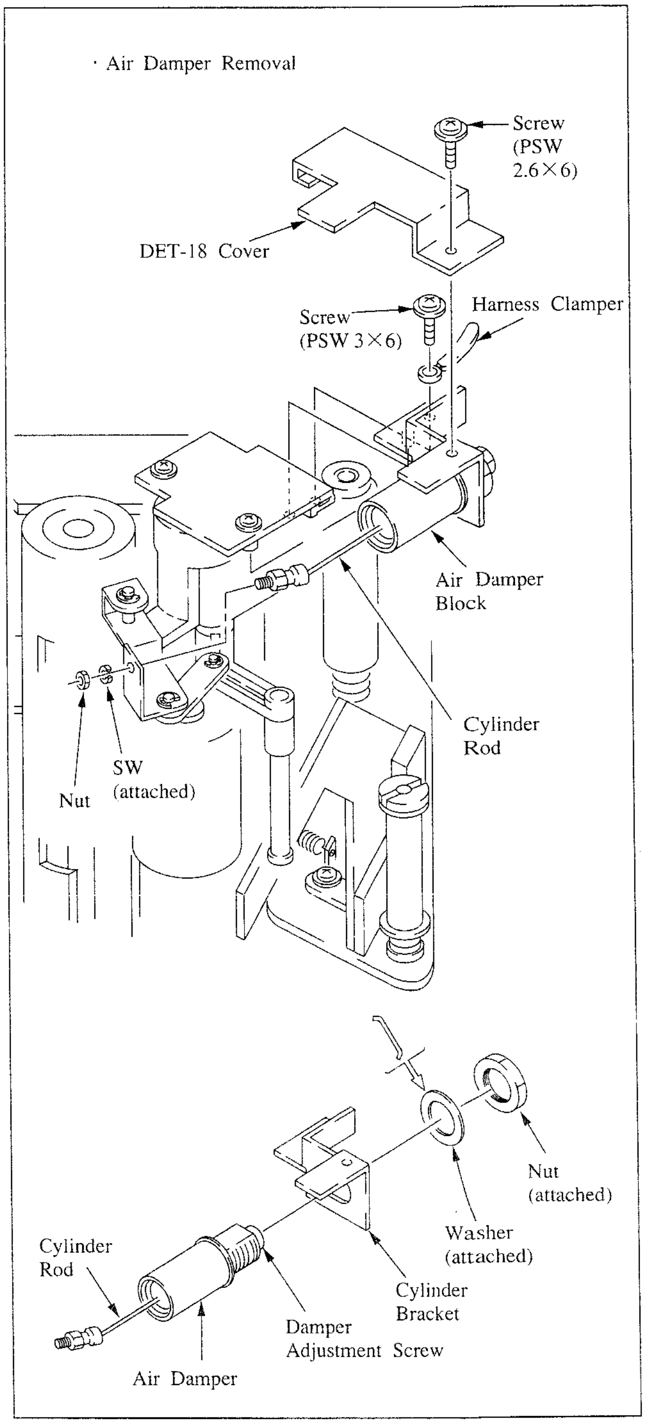

· Air Damper Removal
Screw (PSW 2.6×6)
DET-18 Cover
Screw (PSW 3×6)
Harness Clamper
Air Damper Block
Cylinder Rod
SW (attached)
Nut
Nut (attached)
Washer (attached)
Cylinder Rod
Cylinder Bracket
Damper Adjustment Screw
Air Damper

Fig. 6-11-6 Air Damper Removal

4. T side tape tension adjustment
   Refer to Section 6-11-4.

5. Casset Compartment Ass'y installation
   Refer to Section 6-5.

6. Tape transport adjustment
   Refer to Section 9.

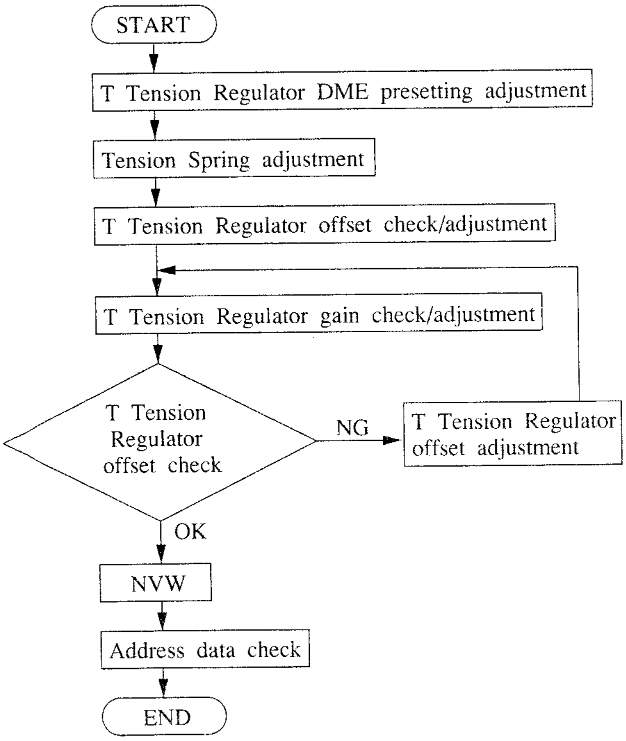
6-11-4. T Side Tape Tension Adjustment

Basic Knowledge

A. This adjustment is necessary when the T Tension Regulator Ass'y is dismounted or replaced.

B. Prepare the following tools.
- T Tension Regulator Adjustment Tool
  Sony Parts No.: J-6257-360-A

C. Adjustment flow chart


START
T Tension Regulator DME presetting adjustment
Tension Spring adjustment
T Tension Regulator offset check/adjustment
T Tension Regulator gain check/adjustment
T Tension Regulator offset check
NG
T Tension Regulator offset adjustment
OK
NVW
Address data check
END

NOTE:
After carring out 1. Step (2), the following WARNING MESSAGE is displayed on the Display.

[NO CASSETTE COMPARTMENT MODE]
S72-2 of SSP/SP board is switched ON

Turn S72 bit2 of switch to OFF after the adjustment, and the WARNING MESSAGE disappears on the Display.

This message is indicated on the display of the VTR that the ROM software versions on the SSP-07 Board are highet than 6.0 versions.

1. Preparations for adjustment.
   (1) Remove the Cassette Compartment.
   Refer to Section 6-5.
   (2) Set S72, Bit 2 of the SSP-07 Board to ON. (Fig. 6-11-7)
   (3) Connect the SSP-07 Board through the extension board (EX-341/341A).
   (4) Connect an oscilloscope as illustrated. (Fig. 6-11-8)

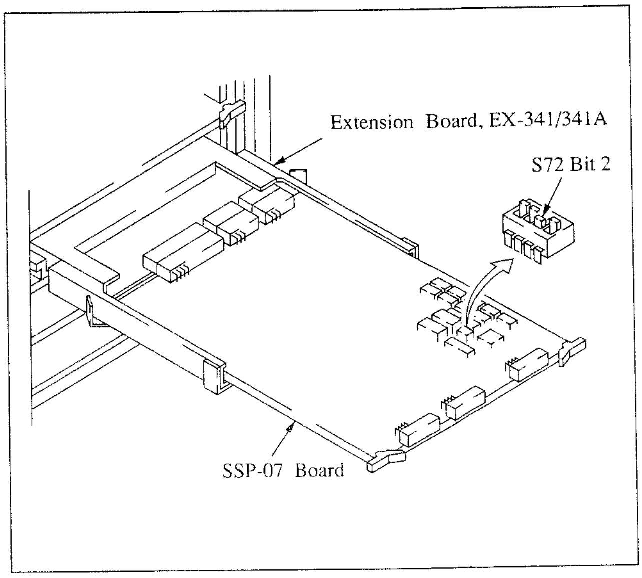

Extension Board, EX-341/341A
S72 Bit 2
SSP-07 Board

Fig. 6-11-7 Preparation for Adjustment (1)

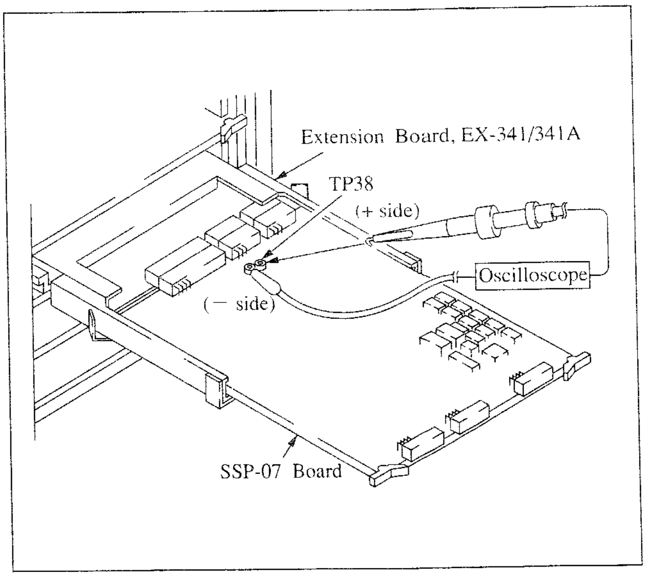

Extension Board, EX-341/341A
TP38
(+ side)
Oscilloscope
(− side)
SSP-07 Board

Fig. 6-11-8 Preparation for Adjustment (2)

2. T Tension Regulator DME preset adjustment (Fig. 6-11-9)
   (1) Set the positoning guide as illustrated.
   (2) Make sure that the voltage of TP38 on the SSP-07 Board satisfies the specification after the step 1.

   Specification: 0±20mV

   If the specification is satisfied, take the procedure from the step (4).
   If it is not satisfied, take the procedure from the step (3).

   (3) Satisfy the specification by loosening the two screws of the DET-18 Board shown in the illustration and moving the DET-18 Board toward the direction of the arrow. (Fig. 1)
   (4) Tighten the two screws and smear a small amount of locking compound ("screw lock") to the heads of the screws.
   (5) Dismount the positoning guide.

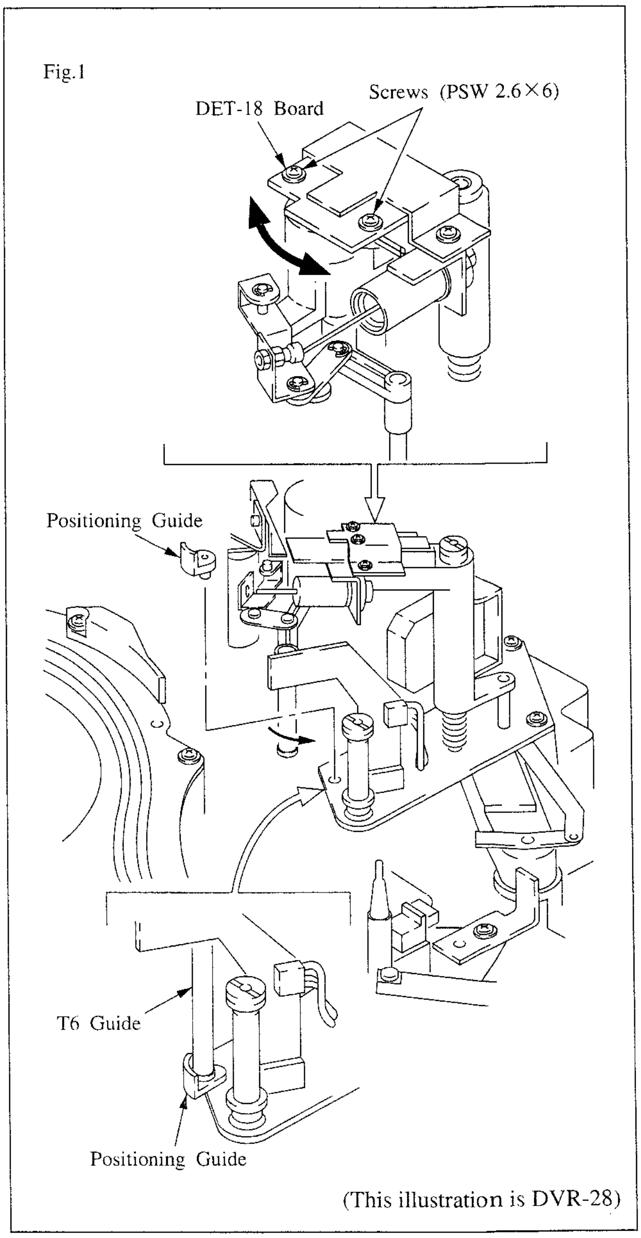


Fig.1
DET-18 Board
Screws (PSW 2.6×6)
Positioning Guide
T6 Guide
Positioning Guide
(This illustration is DVR-28)

Fig. 6-11-9 **T Tension Regulator DME Preset Adjustment**

3. Tool installation

Note: Turn off the power before mounting the tool.
Turn on the power after mounting it.

(1) Remove the screws which fix the Tape Protector (T) and dismount the Tape Protector (T). (Fig. 6-11-10)
(2) Dismount the Link Stopper by removing the screw which locks the Link Stopper.

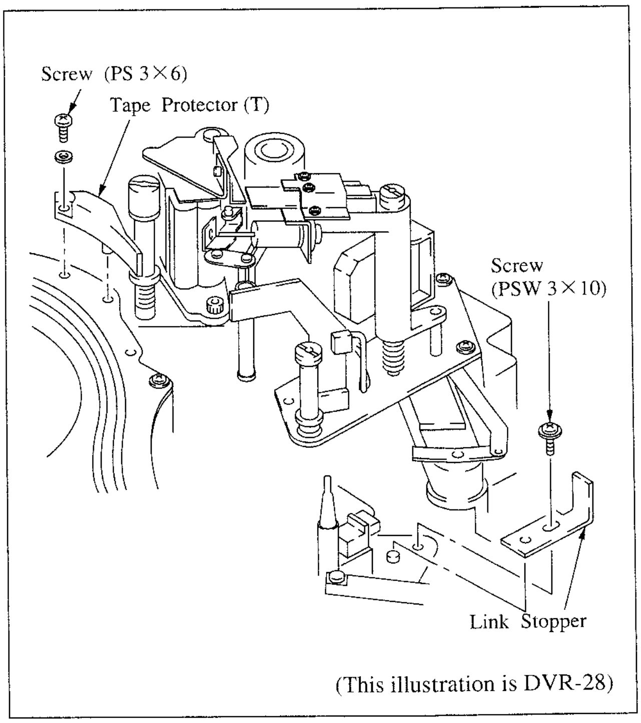

Screw (PS 3×6)
Tape Protector (T)
Screw (PSW 3×10)
Link Stopper
(This illustration is DVR-28)

Fig. 6-11-10 Tool Installation (1)

(3) Mount a tape setting tool where the Tape Protector was mounted. (Fig. 6-11-11)
(4) Mount the adjustment Plate Ass'y using the screws which were used for fixing the Link Stopper as illustrated.

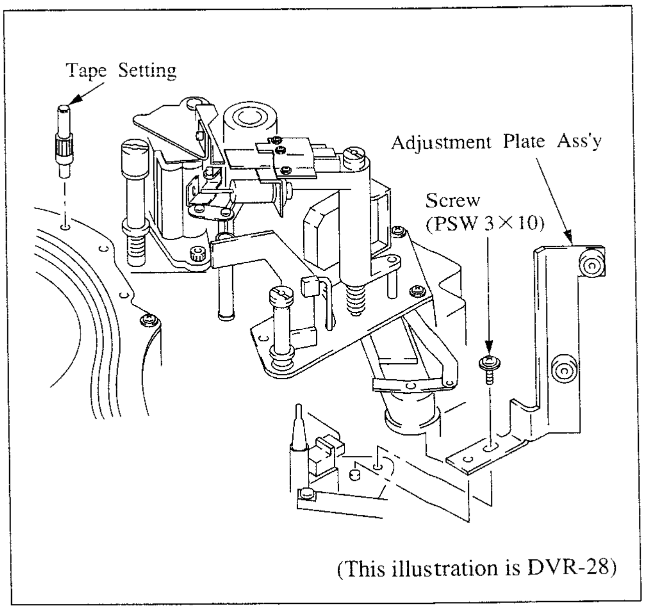

Tape Setting
Adjustment Plate Ass'y
Screw (PSW 3×10)
(This illustration is DVR-28)

Fig. 6-11-11 Tool Installation (2)

4. Tension Spring adjustment
   (1) Set a Wire Ass'y as illustrated and suspend the weight (42). (Fig. 6-11-12)
   Set the machine to the threading end state by turning the Worm Gear of the Loading Motor.
   (2) After lifting and lowering the weight 2 or 3 times by hand, make sure that the voltage of TP38 on the SSP-07 Board satisfies the specifi-cation.

   Specification: 0±20mV

   If the specification is satisfied, take the procedure from the step (4).
   If it is not satisfied, take the procedure from the step (3).
   (3) Satisfy the specification by loosening the adjusting screw shown in the illustration and moving the spring plate in the arrow direction. (Fig. 6-11-12, Fig. 1)
   (4) Tighten the adjusting screw (1).
   (5) Smear a small amount of locking compound ("screw lock") to the head of the adjusting screw.

5. Restore the SSP-07 Board to the original state by reversing the procedure of the step 1 (2) and (3).

6. T Tension Regulator offset check/adjustment.

   (1) Press keys on the control panel in the following sequence.
   [BKDV-101]
   TEST , F6 (CHECKER)
   F2 (SV)
   F3 (C), 2 , F1 (A), SET

   [BKDV-200 series]
   ① SHIFT + SET UP
   ② ENTRY + center key + search dial (or V key) to enter the <TEST> menu.
   Turn the search dial clockwise or press V key to select 807. [CHECKER MODE.]
   ③ Press the > key to move the cursor to EXECUTE.
   ④ Press the Λ key to enter CHECKER mode.
   ⑤ SHIFT , F3 (BOARD)
   ⑥ Entry C2A by pressing the monitor select key.
   INPUT CHECK + 2 (C), 2
   INPUT CHECK + 0 (A), SET

   C and A can be input by selecting in the search dial and F1 (ALPH SET) key as well.

   Display the output value on the display. (Fig. 6-11-13, 14)

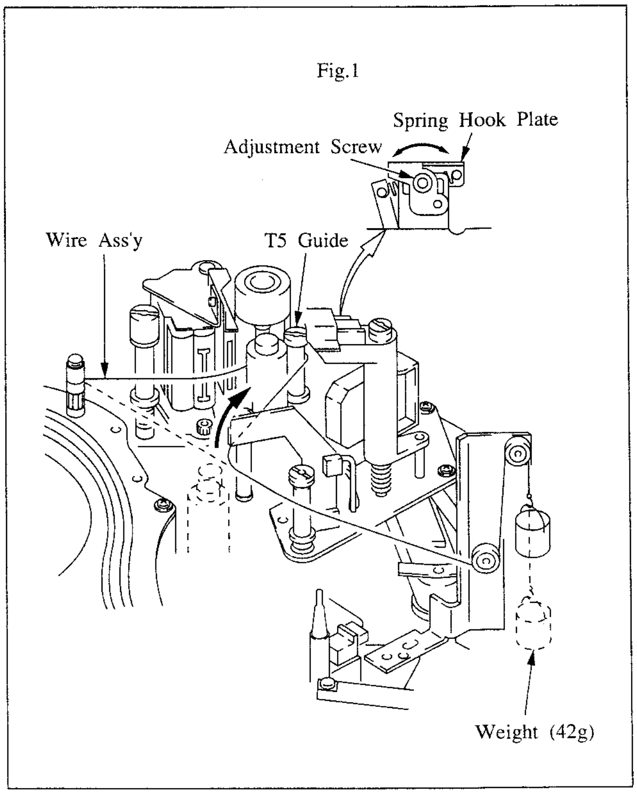


Fig. 6-11-12 Tension Spring

(2) Make sure that the "a" part in Fig. 6-11-13 or 14 satisfies the specification.

Specification: 90 ± 1 (HEX)

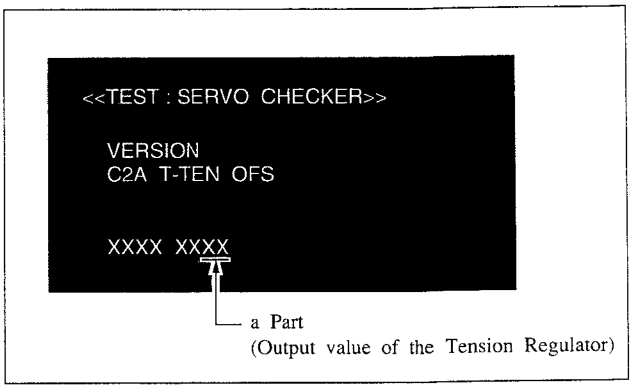
If the specification is satisfied, take the procedure from the step (4).
If it is not satisfied, take the procedure from the step (3).

(3) Satisfy the specification by pressing the [<], [>] keys on the control panel.

(4) After making the adjustment, press the following key.

[BKDV-101] [SET]

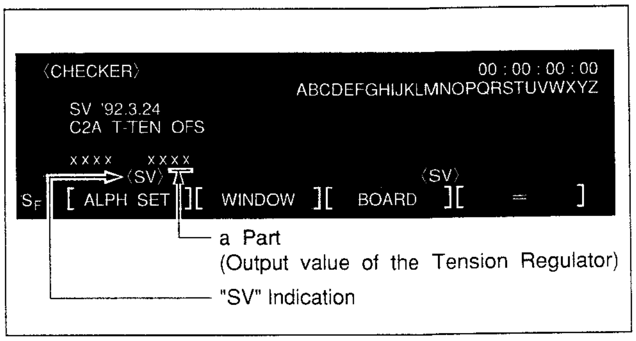
[BKDV-200 series] [SET] of the monitor select key



```
<<TEST : SERVO CHECKER>>

  VERSION
  C2A  T-TEN  OFS


  XXXX  XXXX
```

a Part
(Output value of the Tension Regulator)

Fig. 6-11-13 Display (BKDV-101)



```
〈CHECKER〉                                    00 : 00 : 00 : 00
                                 ABCDEFGHIJKLMNOPQRSTUVWXYZ
  SV  '92.3.24
  C2A  T-TEN  OFS

  xxxx    xxxx
            〈SV〉                        〈SV〉
SF [ ALPH SET ][  WINDOW  ][  BOARD  ][   =   ]
```

a Part
(Output value of the Tension Regulator)
"SV" Indication

Fig. 6-11-14 Display (BKDV-200 Series)

(5) Hit the * part shown in Fig. 6-11-15 lightly 2 or 3 times. Make sure that the specification of the step (2) is satisfied. If it is not satisfied, repeat the procedure from the step (3).

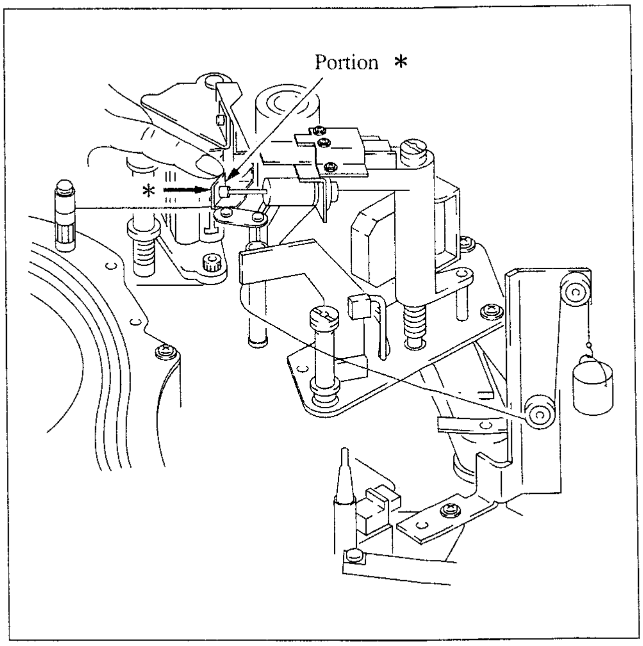


Fig. 6-11-15 T Tension Regulator Offset Adjustment

7. Remove the weight (42 g) and the Wire Ass'y which were set in the step 4 (1).

8. T Tension Regulator gain check/adjustment
   (1) Press keys on the control panel in the following sequence.

   [BKDV-101]
   F3 (C), 2, F2 (B), SET

   [BKDV-200 series]
   Entry C2B by pressing the monitor select keys.
   INPUT CHECK +2 (C), 2
   INPUT CHECK +1 (B), SET

   C and B can be input by selecting it the search dial and F1 (ALPH SET) key as well.

   Display the output value on the display. (Fig. 6-11-16)

   (2) Make sure that the "b" part in Fig. 6-11-16 satisfies the specification.

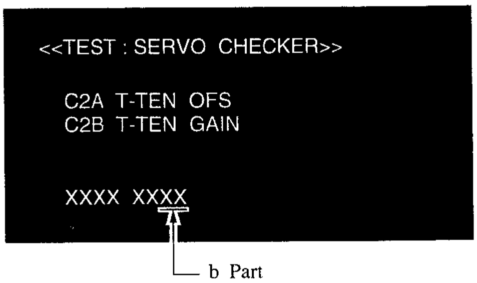
   Specification: 0F±3 (HEX)

   If the specification is satisfied, take the procedure from the step (4).
   If it is not satisfied, take the procedure from the step (3).
   (3) Satisfy the specification by pressing the < > keys on the control panel.
   (4) After making the adjustment, press the following key.

   [BKDV-101] SET

   [BKDV-200 series] SET of the monitor select key

   (5) Hit the * part shown in Fig. 6-11-17 lightly 2 or 3 times. Make sure that the specification of the step (2) is satisfied. If it is not satisfied, repeat the procedure from the step (3).



```
<<TEST : SERVO CHECKER>>

  C2A T-TEN OFS
  C2B T-TEN GAIN


  XXXX XXXX
```

Fig. 6-11-16 T Tension Regulator Gain Check (on the Display of BKDV-101)

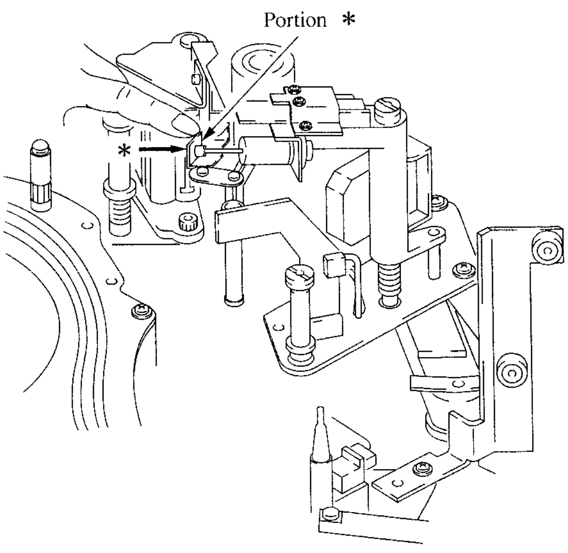


Fig. 6-11-17 T Tension Regulator Gain Adjustment

9. T Tension Regulator offset check
   (1) Set the Wire Ass'y and the weight (42g) which were removed in the step 7.
   (2) Make sure that the "b" part in Fig. 6-11-18 satisfies the specification.

   Specification: 90 ± 1 (HEX)

   If the specification is satisfied, take the procedure from the step 10.
   If it is not satisfied, take the procedure from the step 6.

10. NVW
   (1) Press keys on the control panel in the following sequence.

   [BKDV-101]
   [F12] (EXIT), [F1] (SP), [F10] (NVW)
   Keep pressing the [/] key until "PUSH NVWR SW" is displayed on the display.

   [BKDV-200 series]
   ① Return to the SP CHECKER mode by pressing [F3] (BOARD) twice.
   ② Exit from the SHIFT mode by pressing [SHIFT].
   ③ [F4] (NVW)
   ④ [SET] of the monitor select key.
   ⑤ Keep pressing the [F3] (/) key until "PUSH NVWR SW" is displayed on the display.

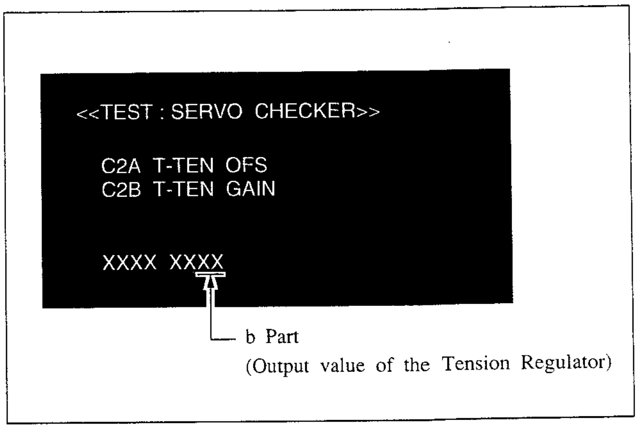
   (2) Press S71(NVWR SW) of the SSP-07 Circuit Board.
   Make sure that "READY" is displayed on the display.

11. Turn off the power.

12. Remove the weight (42g) and the Wire Ass'y.

13. Dismount the tools by reversing the step 3 procedure.

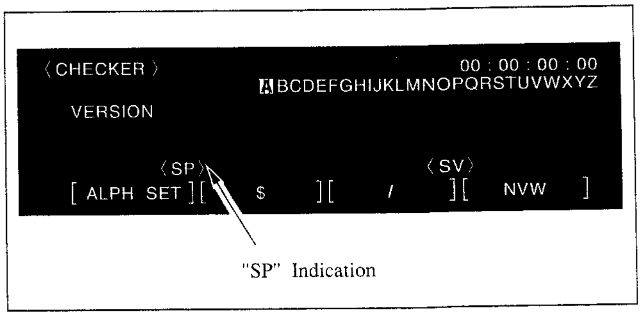
14. Set S72, Bit 2 of the SSP-07 Board to OFF.



```
<<TEST : SERVO CHECKER>>

  C2A T-TEN OFS
  C2B T-TEN GAIN


  XXXX XXXX
```

b Part
(Output value of the Tension Regulator)

Fig. 6-11-18 T Tension Regulator Offset Check (on the Display of BKDV-101)



```
〈CHECKER〉                          00 : 00 : 00 : 00
                               ABCDEFGHIJKLMNOPQRSTUVWXYZ
  VERSION

                 〈SP〉                  〈SV〉
 [ ALPH SET ][    $    ][   /    ][  NVW   ]
```

"SP" Indication

Fig. 6-11-19 SP CHECKER Mode (BKDV-200 Series)

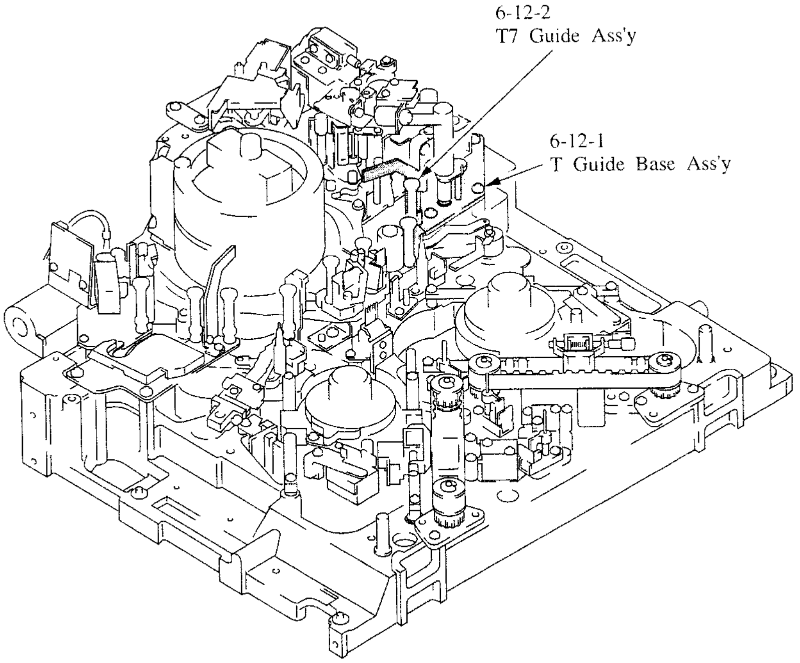
6-12. T GUIDE BASE ASS'Y COMPONENTS REPLACEMENT

Basic Knowledge

A. The T Guide Base Ass'y is shown in Fig. 6-12-1.
This section is concerned with the following components of the T Guide Base Ass'y.
6-12-1. T Guide Base Replacement
6-12-2. T7 Guide Ass'y Replacement

B. The T Tension Regulator Ass'y is mounted on the T Guide Base. For details of its replacement, refer to Section 6-11.

C. Prepare the following tools for replacement or adjustment.
- Cleaning liquid (or equivalent)
  Sony Parts No. : 9-919-573-00
- Cleaning piece
  Sony Parts No. : 2-034-697-00
- Reference Plate (28) : DM-739
  Sony Parts No. : J-6257-390-A
- Reel Table Height Adjustment Tool : JB-5219-B
  Sony Parts No. : J-6252-190-B
- Thickness Gauge
  Sony Parts No. : J-6041-670-A



(This illustration is DVR-28)

Fig. 6-12-1 T Guide Base Ass'y

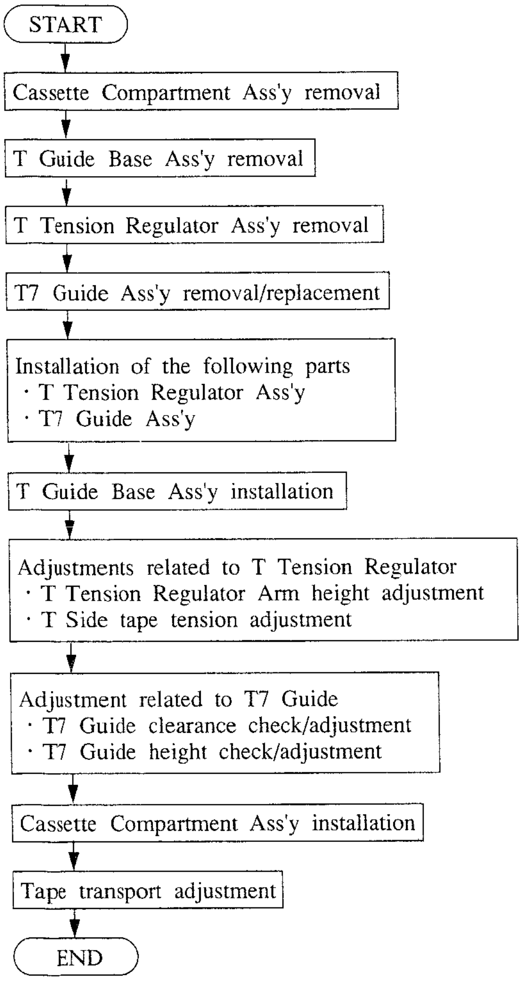
6-12-1. T Guide Base Replacement

Basic Knowledge

A. The following parts must be dismounted before the replacement.
- Cassette Compartment Ass'y
- T Tension Regulator Ass'y (Section 6-11-1)
- T7 Guide Ass'y (Section 6-12-2)

If you want to replace the above parts only, replace them and make adjustments according to the instructions in ( ).

B. Replacement flowchart


START
Cassette Compartment Ass'y removal
T Guide Base Ass'y removal
T Tension Regulator Ass'y removal
T7 Guide Ass'y removal/replacement
Installation of the following parts
· T Tension Regulator Ass'y
· T7 Guide Ass'y
T Guide Base Ass'y installation
Adjustments related to T Tension Regulator
· T Tension Regulator Arm height adjustment
· T Side tape tension adjustment
Adjustment related to T7 Guide
· T7 Guide clearance check/adjustment
· T7 Guide height check/adjustment
Cassette Compartment Ass'y installation
Tape transport adjustment
END

Removal

1. Cassette Compartment Ass'y removal
   Refer to Section 6-5.

2. T Guide Base Ass'y removal (Fig. 6-12-2)
   (1) Remove all the connectors shown in the figure and release the harnesses from the harness clamps.
   (2) Unhook the spring shown in the figure.
   (3) Remove the two screws and take out the T Guide Base Ass'y in the arrow direction.

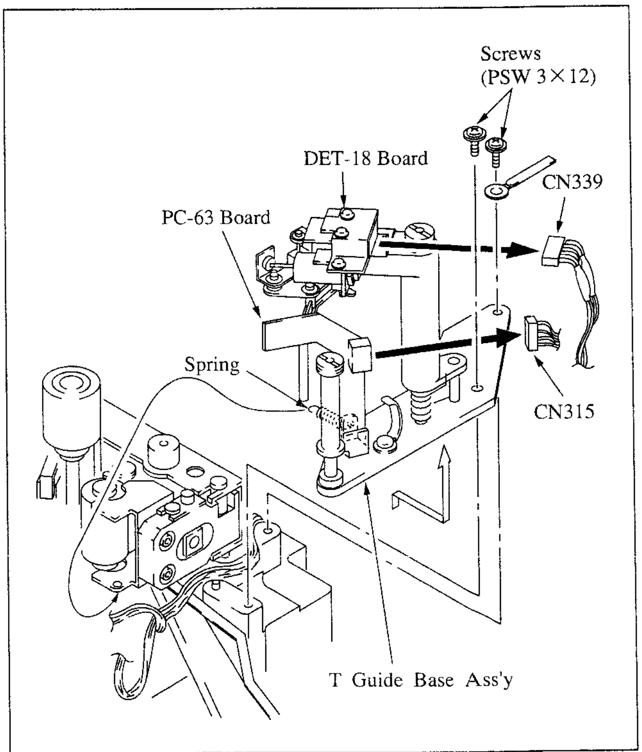

Screws
(PSW 3×12)
DET-18 Board
CN339
PC-63 Board
Spring
CN315
T Guide Base Ass'y

Fig. 6-12-2 T Guide Base Ass'y Removal

3. T Tension Regulator Ass'y removal (Fig. 6-12-3)
   - Dismount the T Tension Regulator Ass'y by removing the screw shown in the figure.

   Note: The setscrew of the screw holding the T Tension Regulator Ass'y is used to adjust the Tension Regulator height. The height has already been adjusted. Do not turn it unless necessary.

4. T7 Guide Ass'y removal
   Refer to Section 6-12-2.

   The T Guide Base can be replaced by the above steps.

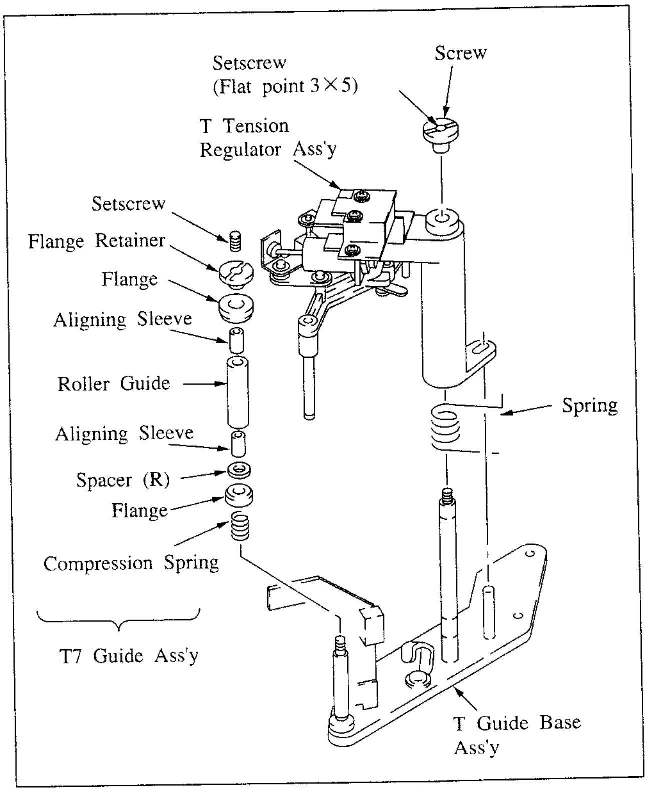

Setscrew
(Flat point 3×5)
Screw
T Tension
Regulator Ass'y
Setscrew
Flange Retainer
Flange
Aligning Sleeve
Roller Guide
Aligning Sleeve
Spacer (R)
Flange
Compression Spring
T7 Guide Ass'y
Spring
T Guide Base
Ass'y

Fig. 6-12-3 T Tension Regulator Ass'y/T7 Guide Ass'y Removal

Installation

5. Install the following parts :
   - T Tension Regulator Ass'y
   - T7 Guide Ass'y

   Mount the above two parts on a new T Guide Base by reversing the procedures of steps 3 and 4.

   Note: Hook the spring shown in Figure 6-12-3 correctly when mounting the T Tension Regulator Ass'y.

6. T Guide Base Ass'y installation
   (1) Clean the mounting surfaces of the T Guide Base Ass'y and the Base Plate with a cloth (or gauze) moistened with cleaning liquid.
   (2) Mount the T Guide Base Ass'y by reversing the step 2 procedures.

   Note 1: Set the harness so as not to protrude from the T Guide Base.
   Otherwise the harness might be cut off by the Cassette Compartment.

   Note 2: Clean the T7 Guide Ass'y with a cleaning piece moistened with cleaning liquid. Be sure to wipe with a dry piece two or three times after cleaning.

Adjustment

7. Make the following adjustments. (Adjustments related to the T Tension Regulator)
   - T Tension Regulator Arm height adjustment
   - T side tape tension adjustment

   Refer to Section 6-11-1.

8. Make the following adjustments. (Adjustments related to the T7 Guide Ass'y)
   - T7 Guide clearance check/adjustment
   - T7 Guide height check/adjustment

   Refer to Section 6-12-2.

9. Cassette Compartment Ass'y insallation
   Refer to Section 6-5.

10. Tape transport adjustment
    Refer to Section 9.

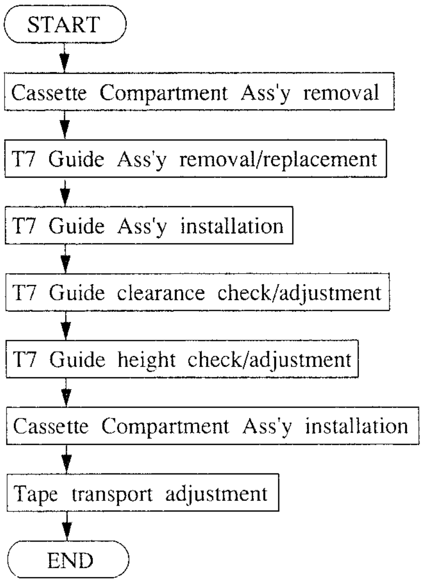
6-12-2. T7 Guide Ass'y Replacement

Basic Knowledge

A. Dismount the Cassette Compartment Ass'y before replacing the T7 Guide.

B. Refer to Basic Knowledge in Section 6-12 before replacement or adjustment.

C. Replacement flowchart


START
Cassette Compartment Ass'y removal
T7 Guide Ass'y removal/replacement
T7 Guide Ass'y installation
T7 Guide clearance check/adjustment
T7 Guide height check/adjustment
Cassette Compartment Ass'y installation
Tape transport adjustment
END

Replacement

1. Cassette Compartment Ass'y removal
   Refer to Section 6-5.

2. T7 Guide Ass'y removal (Fig. 6-12-4)
   (1) Remove the Flange Retainer shown in the figure.
   The T7 Guide Ass'y components can be dismounted.

   Note: The setscrew is used to adjust the T7 Guide height. Do not turn it unless necessary.

   (2) Replace the components that must be replaced.

3. T7 Guide Ass'y installation
   (1) Clean the Roller Guide Shaft with a cleaning cloth (or gauze) moistened with cleaning liquid.
   (2) Clean the edges of the T7 Guide Ass'y with a cleaning piece moistened with cleaning liquid. Be sure to wipe with a dry cloth two or three times after cleaning.
   (3) Mount the components by reversing the step 2 procedure.

   Note: When install the Flange and Roller Guide (X) Ass'y, take care of their directions.

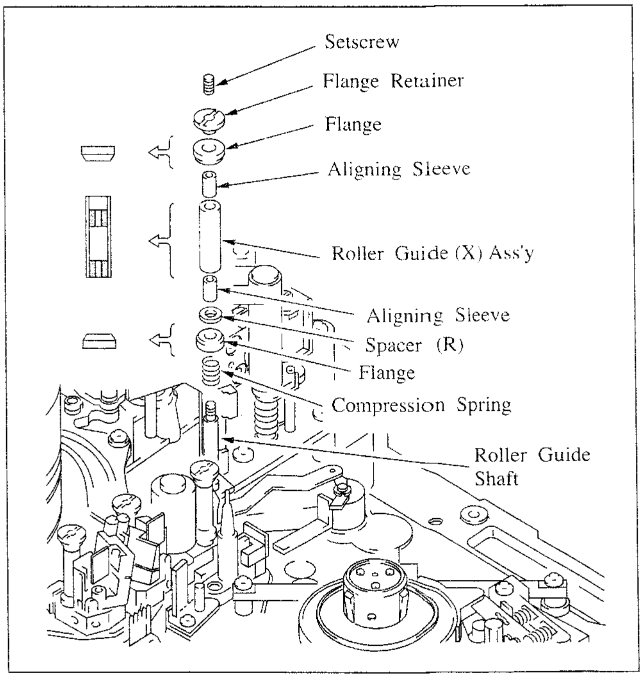

Setscrew
Flange Retainer
Flange
Aligning Sleeve
Roller Guide (X) Ass'y
Aligning Sleeve
Spacer (R)
Flange
Compression Spring
Roller Guide Shaft

Fig. 6-12-4 T7 Guide Ass'y Removal

Adjustment

4. T7 Guide clearance check/adjustment (Fig. 6-12-5)

Check

(1) Tilt the Roller Guide (X) Ass'y shown in the figure in the A direction. Using a thickness gauge, check if clearances a and b satisfy the specification.

Specification : $0.03\ \text{mm} \leqq a \leqq 0.15\ \text{mm}$
$0.03\ \text{mm} \leqq b \leqq 0.15\ \text{mm}$

If the clearances fail to satisfy the specification, make the following adjustment.

Adjustment

If the clearance is too large (when it is larger than 0.15 mm) :

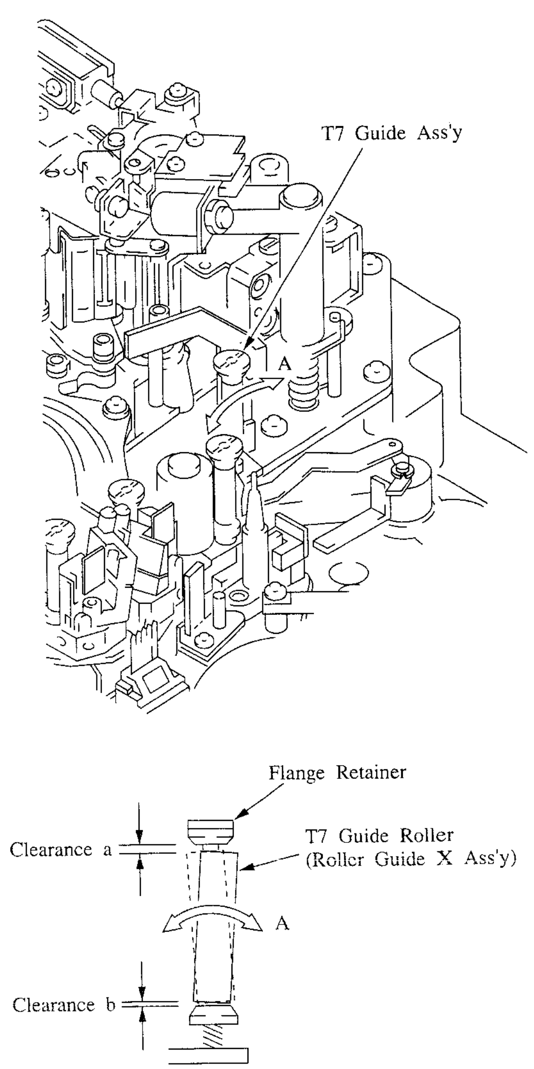
(2) Disassemble the T7 Guide Ass'y and replace the Aligning Sleeve in the side of the larger clearance.

If the clearance is too small (when it is smaller than 0.03 mm) :

(3) Disassemble the T7 Guide Ass'y and insert one or two spacers (R) in the side of the smaller clearance.

(4) Check the clearances again by step (1). If they still fail to satisfy the standards, repeat step (2) or (3).

(5) After completion of adjustment, clean the outer surfaces of the Roller Guide (X) Ass'y with a cleaning piece moistened with cleaning liquid. Be sure to wipe with a dry cloth two or three times after cleaning.



(This illustration is DVR-28)

Fig. 6-12-5 T7 Guide Ass'y Clearance Check/Adjustment

5. T7 Guide height check/adjustment (Fig. 6-12-6)

Preparation

Clean the Base Plate surface where the reference plate will be mounted and the adjusting surface of the reel table height tool with a cloth moistened with cleaning liquid.
Then set the tools.

Check

(1) Set the reference plate on the machine.
Then, place a 0.09 mm thickness gauge on the reference plate and set the reel table height asjustment tool.

Note: When the reference plate is set, the Reel Table must be set at the M or L cassette position.
Set the reel position by referring to Basic Knowledge in Section 6-7.

(2) Place the reel table height adjustment tool against the T7 Guide and check if part D (clearance between the Upper Flange and the tool) satisfies the specification.

Specification: There should be no clearance at part D.

If part D fails to satisfy the specification, make the following adjustment.

Adjustment

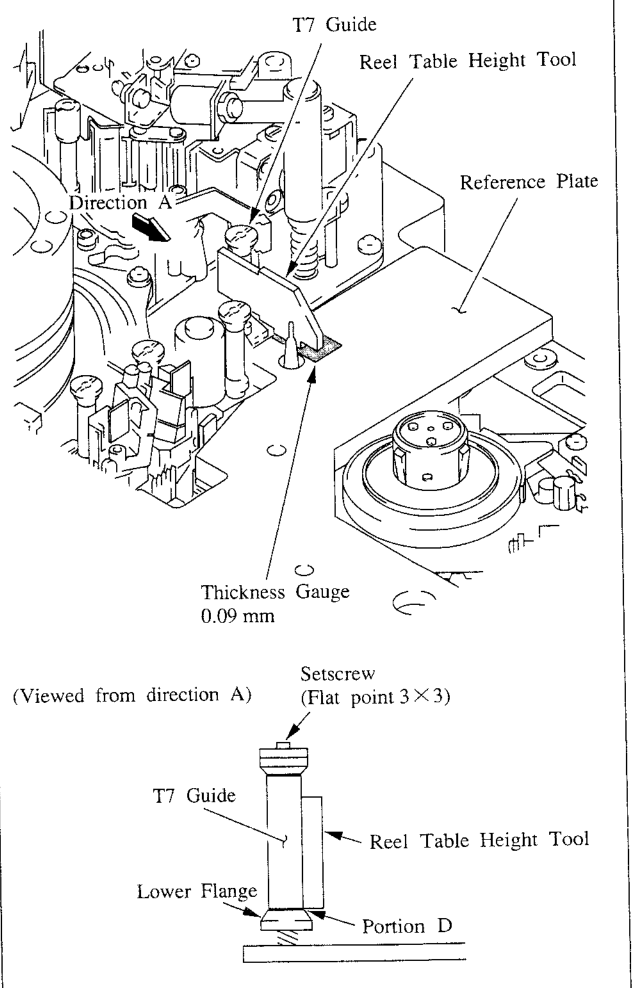
(3) Loosen the setscrew shown in the figure and turn the Flange Retainer until the specification is satisfied.
Use a 1.5 mm hexagonal wrench.

(4) Tighten the setscrew and repeat step (2).
Tightened Torgue: 58.8x10^{-2} N·m (6 kgf·cm)

(5) When the specification is satisfied, remove the reference plate, the thickness gauge and the reel table height adjustment Tool from the machine.

6. Cassette Compartment Ass'y installation
Refer to Section 6-5.

7. Tape transport adjustment
Refer to Section 9.


T7 Guide
Reel Table Height Tool
Reference Plate
Direction A
Thickness Gauge
0.09 mm
(Viewed from direction A)
Setscrew
(Flat point 3×3)
T7 Guide
Reel Table Height Tool
Lower Flange
Portion D

(This illustration is DVR-28)

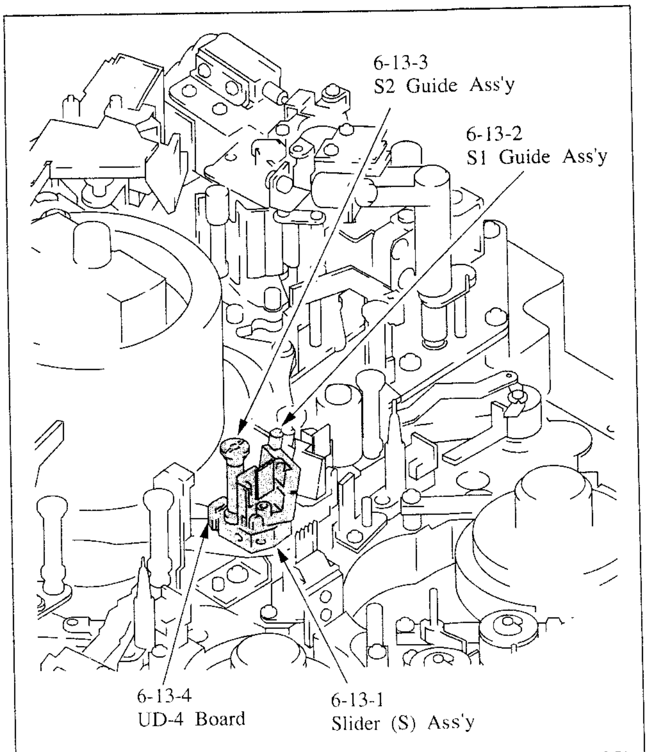
Fig. 6-12-6 T7 Guide Height Check/Adjustment

6-13. SLIDER (S) ASS'Y REPLACEMENT

Basic Knowledge

A. The Slider (S) Ass'y is shown in Fig. 6-13-1.
The replacement methods are explained in the following sections.
6-13-1. Slider (S) Ass'y Replacement
6-13-2. S1 Guide Ass'y Replacement
6-13-3. S2 Guide Ass'y Replacement
6-13-4. UD-4 Board Replacement

B. Prepare the following tools.
- Cleaning piece
  Sony Parts No. : 2-034-697-00
- Confidence Head Adjustment Plate
  Sony Parts No. : J-6257-140-A
- Cleaning liquid (or equivalent)
  Sony Parts No. : 9-919-573-00
- Locking compound (Screw Lock)


6-13-3
S2 Guide Ass'y
6-13-2
S1 Guide Ass'y
6-13-4
UD-4 Board
6-13-1
Slider (S) Ass'y

(This illustration is DVR-28)

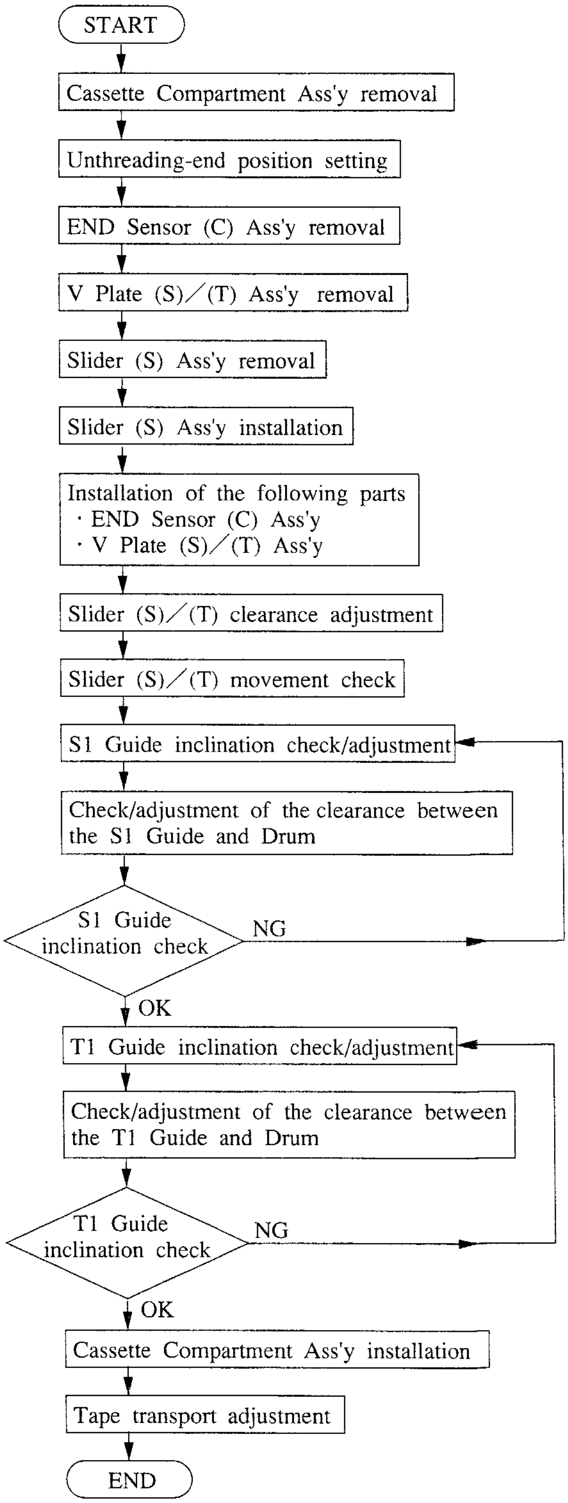
Fig. 6-13-1 Slider (S) Ass'y

6-13-1. Slider (S) Ass'y Replacement

Basic Knowledge

A. Dismount the following parts before replacing the Slider (S) Ass'y.
- Cassette Compartment Ass'y
- END Sensor (C) Ass'y
- V Plate (S)/(T) Ass'y

B. Replacement flowchart


START
Cassette Compartment Ass'y removal
Unthreading-end position setting
END Sensor (C) Ass'y removal
V Plate (S)/(T) Ass'y removal
Slider (S) Ass'y removal
Slider (S) Ass'y installation
Installation of the following parts
· END Sensor (C) Ass'y
· V Plate (S)/(T) Ass'y
Slider (S)/(T) clearance adjustment
Slider (S)/(T) movement check
S1 Guide inclination check/adjustment
Check/adjustment of the clearance between the S1 Guide and Drum
S1 Guide inclination check
NG
OK
T1 Guide inclination check/adjustment
Check/adjustment of the clearance between the T1 Guide and Drum
T1 Guide inclination check
NG
OK
Cassette Compartment Ass'y installation
Tape transport adjustment
END

Replacement

1. Cassette Compartment Ass'y removal
   Refer to Section 6-5.
   Unthreading-end position setting
   Refer to Section 6-(1).

2. END Sensor (C) Ass'y removal (Fig. 6-13-2)
   - Dismount the END Sensor (C) Ass'y by removing the screw that fixes the ass'y.

3. V Plate (S)/(T) Ass'y removal (Fig. 6-13-2)
   (1) Remove the two connectors (CN831, CN832) shown in the figure.
   (2) Dismount the V Plate (S)/(T) Ass'y by removing the two screws (C 3×16) that fix the ass'y.
   Use a hexagonal wrench (across flats of 2.5 mm).

Note: When removing the ass'y, check the thickness and the number of V spacers mounted. When the ass'y is installed, the same number of V spacers in the same thickness as were removed must be mounted.

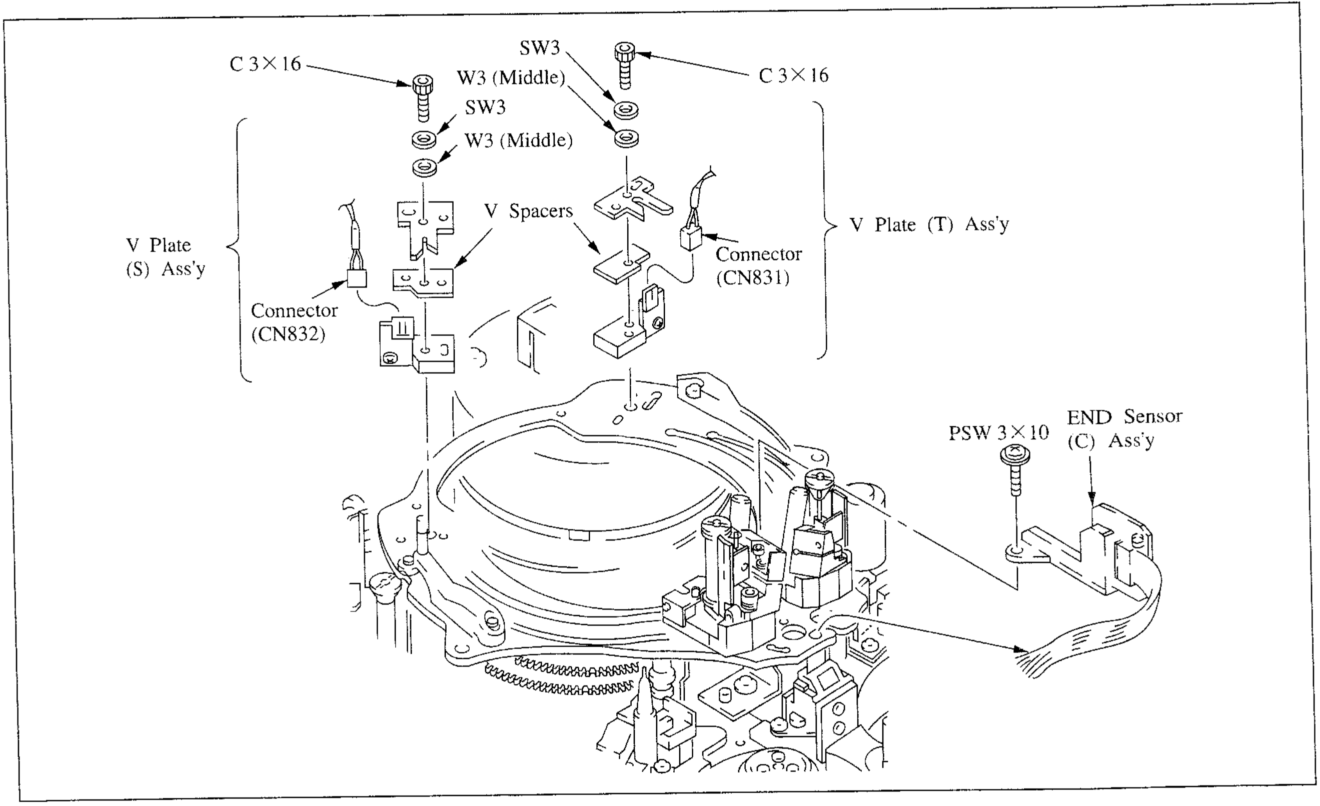

C 3×16
SW3
W3 (Middle)
SW3
W3 (Middle)
C 3×16
V Spacers
V Plate (S) Ass'y
Connector (CN832)
Connector (CN831)
V Plate (T) Ass'y
PSW 3×10
END Sensor (C) Ass'y

Fig. 6-13-2 V Plate (S)/(T) Ass'y Removal

4. Slider (S) Ass'y removal (Fig. 6-13-3)
   (1) Remove the two screws that fix the LD Rail.
   (2) Move section A of the LD Rail up 8 mm to 10 mm and move the Slider (S) Ass'y in the direction of the arrow B to remove it.

   Note: (1) Do not deform the LD Rail by applying excessive forces to it. Work with a sufficient care.
   (2) As Molyton grease is smeared to the Guide Shaft of the Slider (S) Ass'y, take care so as not to smear Molyton grease to another portion.

5. Slider (S) Ass'y installation (Fig. 6-13-3)
   (1) Clean the sliding surface of the LD Rail and the sliding surface (bottom) of the Slider (S) Ass'y with a cloth moistened with cleaning liquid. Be sure to wipe it with a dry cloth after cleaning it.
   (2) Move section A of the LD Rail up 8 mm to 10 mm and install a new Slider (S) Ass'y on the LD Rail in the reverse order of step 4.
   (3) Smear a small amount of Molyton grease to the holes of the S and T links, and insert the Guide Shafts of the Slider (S)/(T) Ass'y shown in the figure into the holes of the S and T links.
   (4) Fix the LD Rail with two screws.

   Note: In fixing the LD Rail, turn it in the direction of arrow C to eliminate the play.

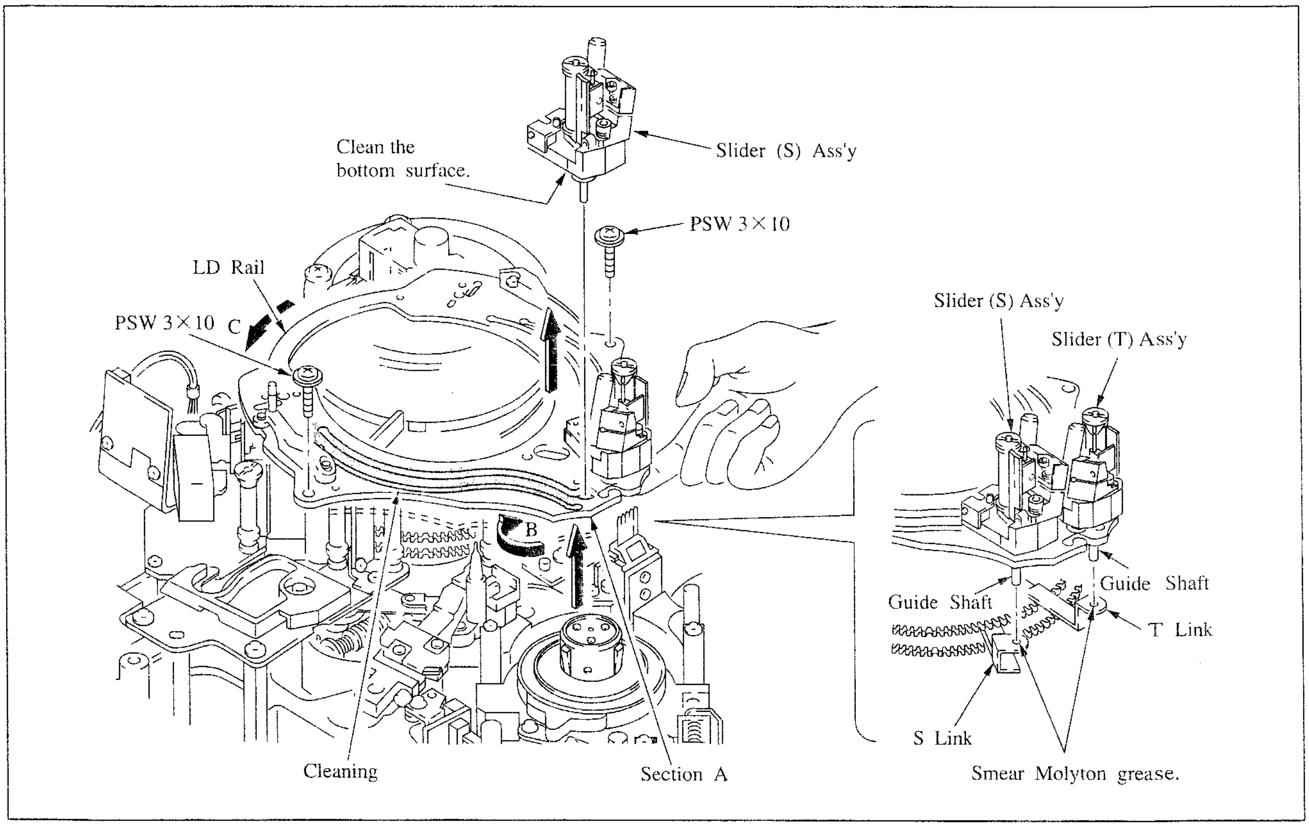

Clean the bottom surface.
Slider (S) Ass'y
PSW 3×10
LD Rail
PSW 3×10
C
B
Cleaning
Section A
Slider (S) Ass'y
Slider (T) Ass'y
Guide Shaft
Guide Shaft
T Link
S Link
Smear Molyton grease.

Fig. 6-13-3 Slider (S) Ass'y Replacement

6. Install the following parts:
   - END Sensor (C) Ass'y
   - V Plate (S)/(T) Ass'y

   Reverse the procedures of steps 2 and 3.

Adjustment

7. Perform the following adjustments.
   (i) Slider (S)/(T) clearance adjustment
   (ii) Slider (S)/(T) movement check
   (iii) S1 Guide inclination check/adjustment
   (iv) Check/adjustment of the clearance between the S1 Guide and Drum
   (v) T1 Guide inclination check/adjustment
   (vi) Check/adjustment of the clearance between the T1 Guide and Drum
   Refer to Section 6-15.
   After making the above adjustments, check the S1 Guide inclination and the T1 Guide inclination again to make sure that their specifications are satisfied. If they are not satisfied, repeat the adjustments from (iii) or (v).

8. Cassette Compartment Ass'y installation
   Refer to Section 6-5.

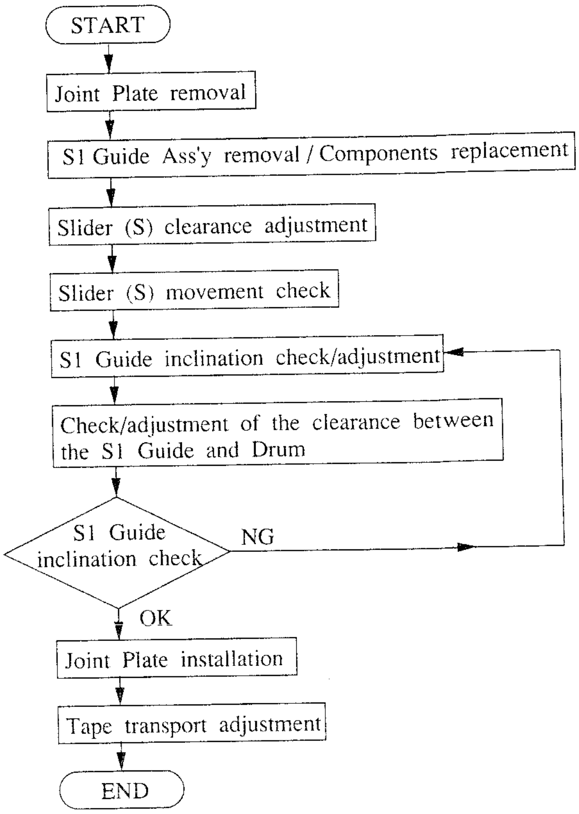
9. Tape transport adjustment
   Refer to Section 9.

6-13-2. S1 Guide Ass'y Replacement

Basic Knowledge

A. Dismount the Joint Plate before replacing the S1 Guide Ass'y. Cassette Compartment Ass'y removal and Unthreading-end position setting have been already carried out as same procedure as Section 6-13-1.

B. Replacement flowchart


START
Joint Plate removal
S1 Guide Ass'y removal / Components replacement
Slider (S) clearance adjustment
Slider (S) movement check
S1 Guide inclination check/adjustment
Check/adjustment of the clearance between the S1 Guide and Drum
S1 Guide inclination check
NG
OK
Joint Plate installation
Tape transport adjustment
END

Replacement

1. Joint Plate removal (Fig. 6-13-4)
   (1) Dismount the Joint Plate by removing the two screws which fix the Joint Plate.
   (2) Lift the USE Ass'y in the arrow direction by pushing the lever shown in the figure in the arrow direction.

2. S1 Guide replacement (Fig. 6-13-5)
   (1) Dismount the S1 Guide Holder together with the S1 Guide by removing the screw ① which fixes the S1 Guide Holder. Use a hexagonal wrench (across flats of 2 mm).
   (2) Dismount the S1 Guide from the S1 Guide Holder by removing the screw ② which fixes the guide.
   Use a hexagonal wrench (across flats of 1.5 mm).

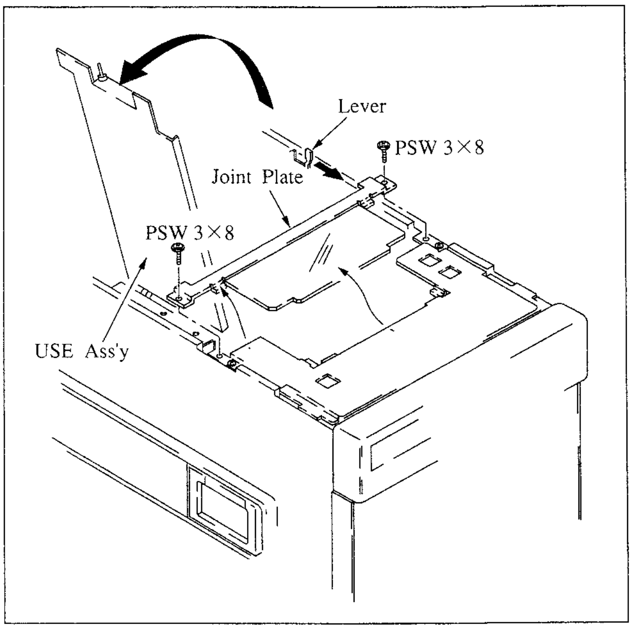

Lever
PSW 3×8
Joint Plate
PSW 3×8
USE Ass'y

Fig. 6-13-4 Joint Plate Removal

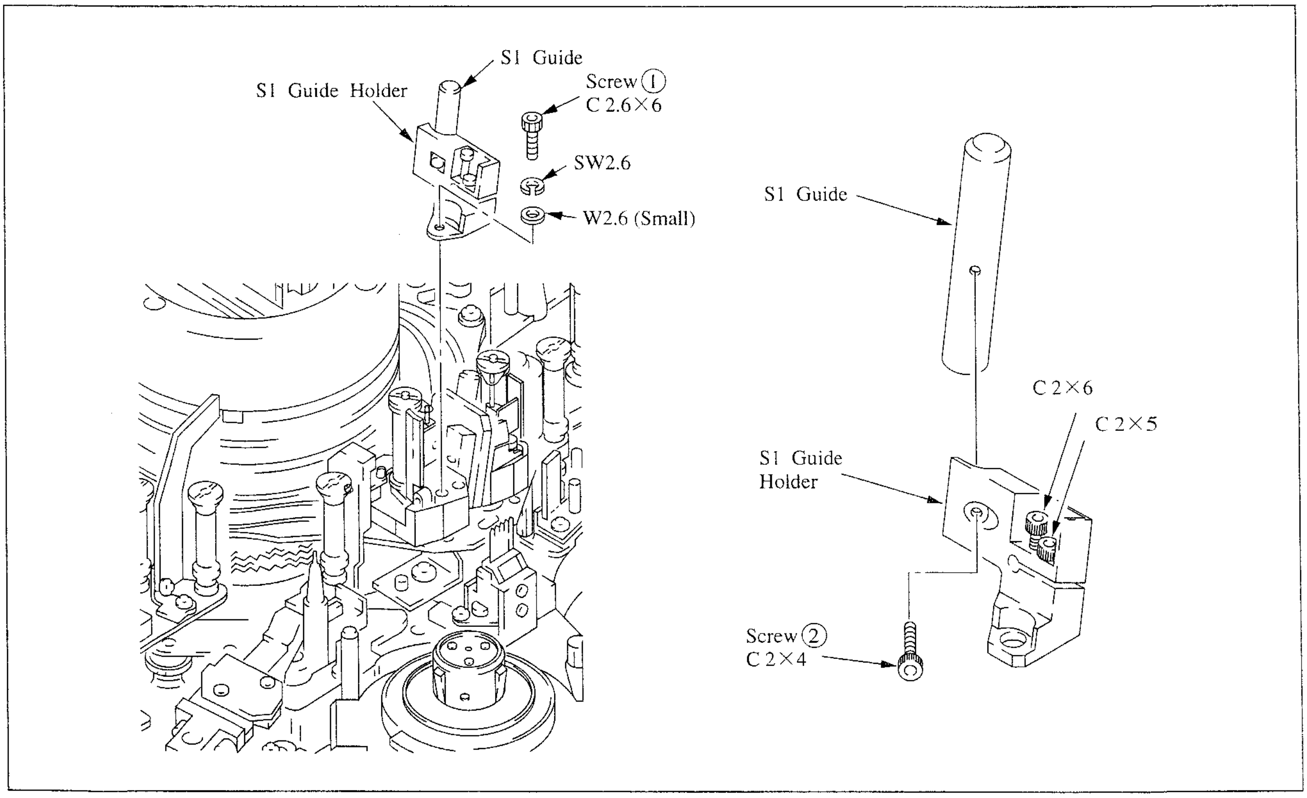

S1 Guide
S1 Guide Holder
Screw①
C 2.6×6
SW2.6
W2.6 (Small)
S1 Guide
C 2×6
C 2×5
S1 Guide Holder
Screw②
C 2×4

Fig. 6-13-5 S1 Guide Ass'y Replacement

(3) S1 Guide installation
Install the S1 Guide to the S1 Guide Holder by reversing the procedure of step (2).
Use a hexagonal wrench (across flats of 1.5 mm).
Tightened torque: 39.2×10^{-2} N·m (4 kgf·cm)

Install the S1 Guide Holder by reversing the procedure of step (1).
Use a hexagonal wrench (across flats of 2.5 mm).
Tightened torque: 58.8×10^{-2} N·m (6 kgf·cm)

Note: In mounting the parts, clean the mounting surfaces with a cleaning piece which is moistened with cleaning liquid. Be sure to wipe them with a dry cloth 2 or 3 times after cleaning.

Adjustment

3. Make the following adjustments.
   (i) Slider (S) clearance adjustment
   (ii) Slider (S) movement check
   (iii) S1 Guide inclination check/adjustment
   (iv) Check/adjustment of the clearance between the S1 Guide and Drum
   Refer to Section 6-15.
   Finally, check the S1 Guide inclination again to make sure that the specification is satisfied. If the specification is not satisfied, repeat (iii) and (iv).
   After making the adjustment, apply locking compound (Screw lock) to the head of the screws which fix the S1 Guide and the S1 Guide Holder.

4. Joint Plate installation
   Reverse the step 1 procedure.

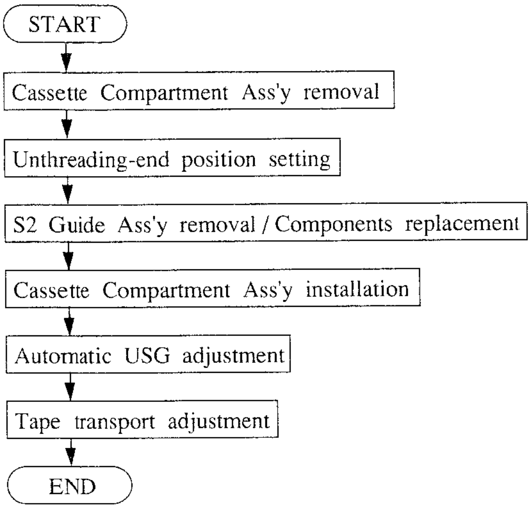
5. Tape transport adjustment
   Refer to Section 9.

6-13-3. S2 Guide Ass'y Replacement

Basic Knowledge

A. Dismount the Cassette Compartment Ass'y before replacing the S2 Guide Ass'y.

B. Replacement flowchart


START
Cassette Compartment Ass'y removal
Unthreading-end position setting
S2 Guide Ass'y removal / Components replacement
Cassette Compartment Ass'y installation
Automatic USG adjustment
Tape transport adjustment
END

Replacement

1. Cassette Compartment Ass'y removal
   Refer to Section 6-5.

2. Unthreading-end position setting (Fig. 6-13-6)
   Refer to Section 6-(1).

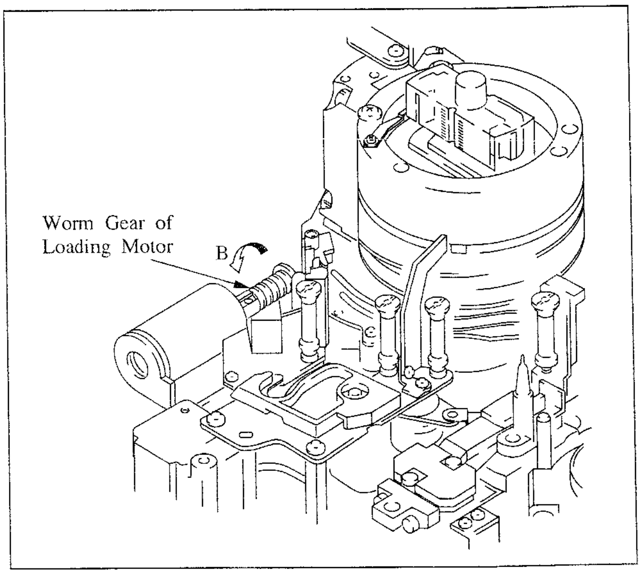

Worm Gear of
Loading Motor
B

Fig. 6-13-6 Unthreading-End Position Setting

3. S2 Guide Ass'y removal/Components replacement
   (1) Dismount the two harnesses from the UD-3 Board shown in the figure using a soldering iron. (Fig. 6-13-7)
   (2) Dismount the UD-3 Board from the Actuator Holder by removing the screw which fixes the board.
   (3) Dismount the components of the S2 Guide Ass'y by removing the Flange Retainer. (Fig. 6-13-8)

   Note: The setscrew of the Flange Retainer already controls the S2 Guide height. Do not turn it unless necessary.

   (4) Replace the components that must be replaced.

   Note: Solder the harnesses as illustrated in Fig. 6-13-7, Fig.1.

   (5) Mount the S2 Guide Ass'y by reversing the procedures of steps (1) through (3).

   Note: After mounting the S2 Guide Ass'y, make sure that there is a clearance between the Upper Flange and the Actuator Ass'y.

4. Cassette Compartment Ass'y installation
   Refer to Section 6-5.

Adjustment

5. Automatic USG asjustment
   Refer to Section 10.

6. Tape transport adjustment
   Refer to Section 9.

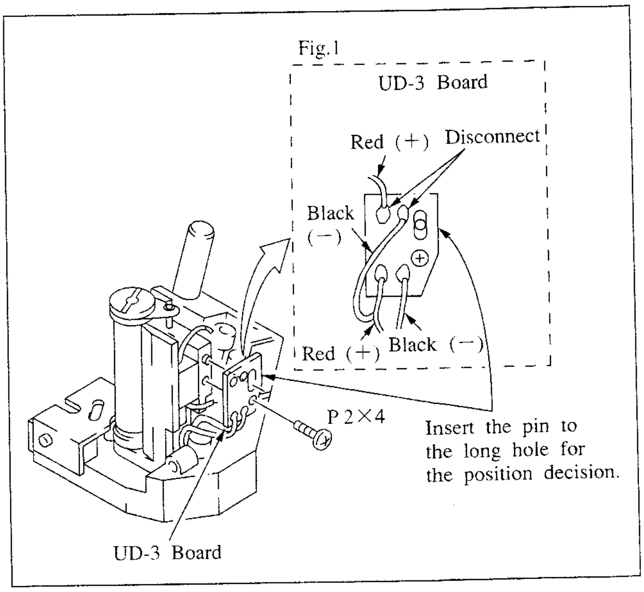


Fig.1
UD-3 Board
Red (+)
Disconnect
Black (−)
Red (+)
Black (−)
P2×4
Insert the pin to the long hole for the position decision.
UD-3 Board

Fig. 6-13-7 UD-3 Board removal

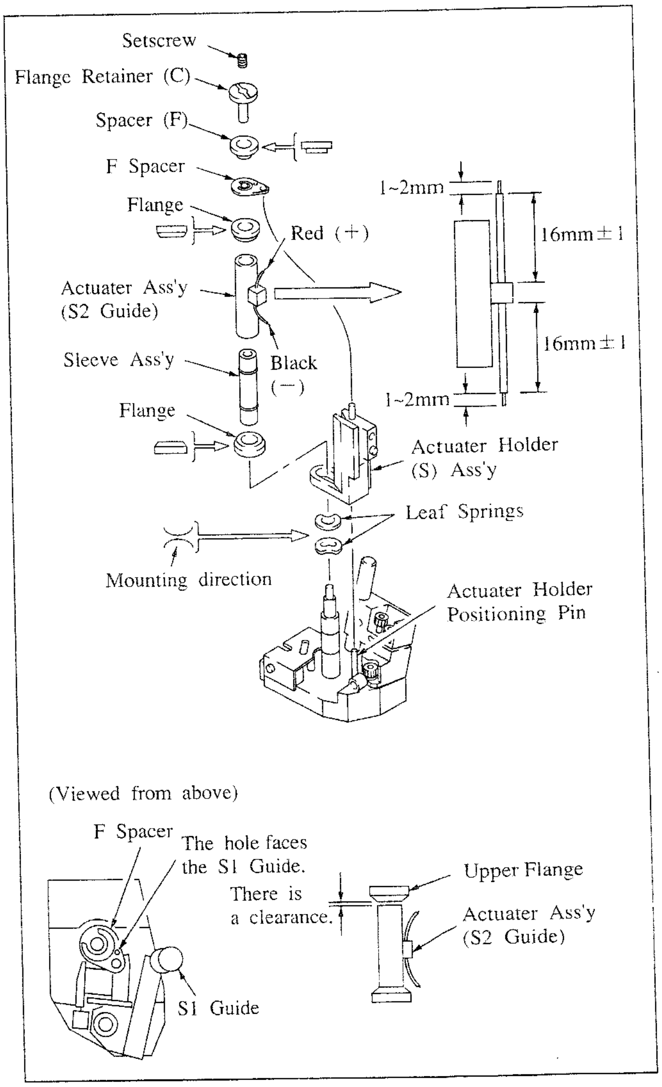

Setscrew
Flange Retainer (C)
Spacer (F)
F Spacer
Flange
Red (+)
Actuater Ass'y (S2 Guide)
Sleeve Ass'y
Black (−)
Flange
1~2mm
16mm±1
16mm±1
1~2mm
Actuater Holder (S) Ass'y
Leaf Springs
Mounting direction
Actuater Holder Positioning Pin
(Viewed from above)
F Spacer
The hole faces the S1 Guide.
There is a clearance.
Upper Flange
Actuater Ass'y (S2 Guide)
S1 Guide

Fig. 6-13-8 S2 Guide Ass'y replacement

6-13-4. UD-4 Board Replacement

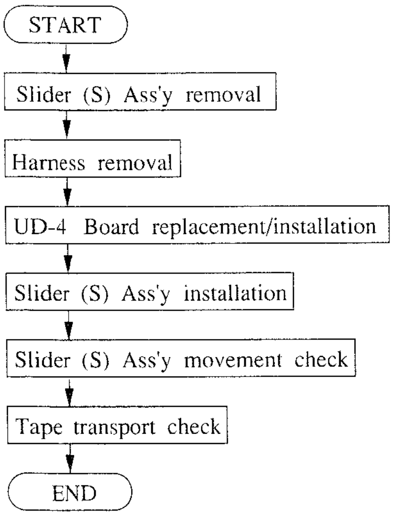
Basic Knowledge

A. The UD-4 board is mounted on the Slider (S) Ass'y. There are two contacts between the UD-4 board and the CN-565 board of the V Plate (S) Ass'y. Usually, these boards are both replaced together at the time of periodic replacement (7500 hrs) of the Slider (S) Ass'y. However, if the board contact is worn out excessively and needs to be replaced, a single board can be replaced alone.

B. Remove the Slider (S) Ass'y from the LD Rail to replace the board. Refer to Section 6-13, "Slider (S) Ass'y Replacement" for the removal/installation procedure.

C. There are no adjustments required after the installation of the board, but the movement of the Slider (S) must be checked after the replacement of the board and the installation of the Slider (S) Ass'y.

D. Replacement flowchart


START
Slider (S) Ass'y removal
Harness removal
UD-4 Board replacement/installation
Slider (S) Ass'y installation
Slider (S) Ass'y movement check
Tape transport check
END

Replacement

1. Slider (S) Ass'y removal
   Refer to Section 6-13-1.

2. Harness removal (Fig. 6-13-9)
   (1) Using a soldering iron, disconnect the two harnesses from the UD-3 Board of the Slider (S) Ass'y as shown in the figure.
   (2) Remove the screw that holds the Cover (S) and then remove the Cover (S).

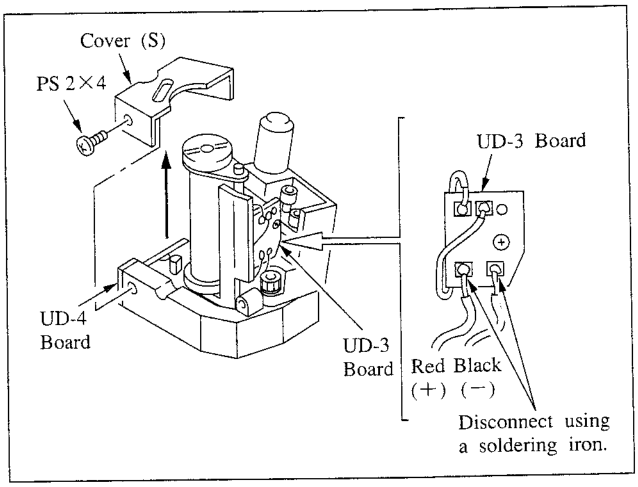

Cover (S)
PS 2×4
UD-3 Board
UD-4 Board
UD-3 Board
Red Black
(+) (−)
Disconnect using a soldering iron.

Fig. 6-13-9 Harness Removal

3. UD-4 Board replacement/installation (Fig. 6-13-10)
   (1) Remove the screw fixing the UD-4 Board, then take out the board.
   (2) Pass the harnesses of a new UD-4 Board to the top through the harness guide groove at the back of the Slider (S) Ass'y.
   (3) Solder the harnesses to the UD-3 Board; one at the red side and the other at the black side.
   (4) Mount the UD-4 Board on the Slider (S) Ass'y and fix the board with a screw. Set the harnesses in the harness guide groove.

   Note: Check that the harnesses are not sticking out from the harness guide groove after installation of the UD-4 Board.

   (5) Press the Cover (S) in the direction of arrow A shown in fig. 6-13-10 and mount the Cover (S) on the Slider (S) Ass'y and fix the cover with a screw.

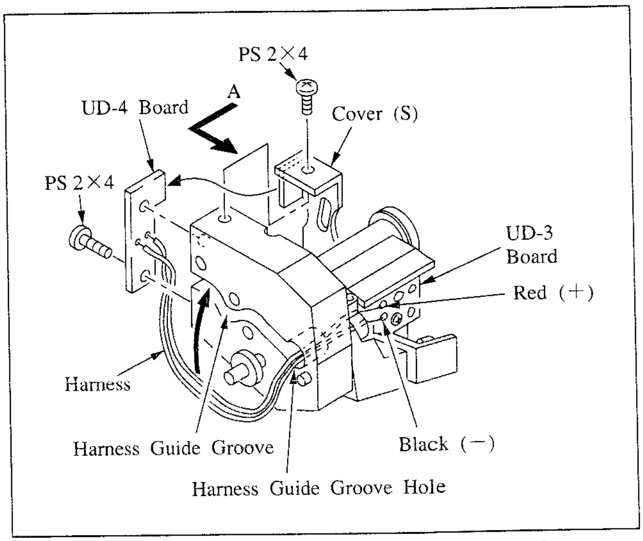

PS 2×4
A
UD-4 Board
Cover (S)
PS 2×4
UD-3 Board
Red (+)
Harness
Harness Guide Groove
Black (−)
Harness Guide Groove Hole

Fig 6-13-10 UD-4 Board Replacement/Installation

4. Slider (S) Ass'y installation
   Refer to Section 6-13-1.

5. Slider (S) Ass'y movement check
   Refer to Section 6-15-2.

6. Tape transport check
   Refer to Section 9.

6-14. SLIDER (T) ASS'Y REPLACEMENT

Basic Knowledge

A. The Slider (T) Ass'y is shown in Fig. 6-14-1.
The replacement methods are explained in the following sections.
6-14-1. Slider (T) Ass'y Replacement
6-14-2. T1 Guide Ass'y Replacement
6-14-3. T2 Guide Ass'y Replacement
6-14-4. UD-5 Board Replacement

B. Prepare the following tools.
- Confidence Head Adjustment Plate
  Sony Parts No.: J-6257-140-A
- Cleaning piece
  Sony Parts No.: 2-034-697-00
- Cleaning liquid (or equivalent)
  Sony Parts No.: 9-919-573-00
- Locking compound (Screw Lock)

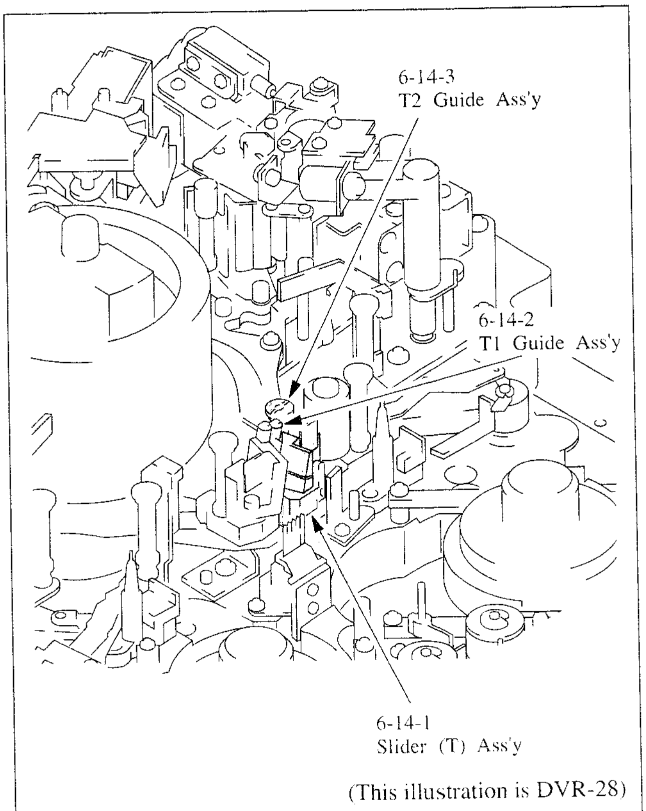

6-14-3
T2 Guide Ass'y
6-14-2
T1 Guide Ass'y
6-14-1
Slider (T) Ass'y
(This illustration is DVR-28)

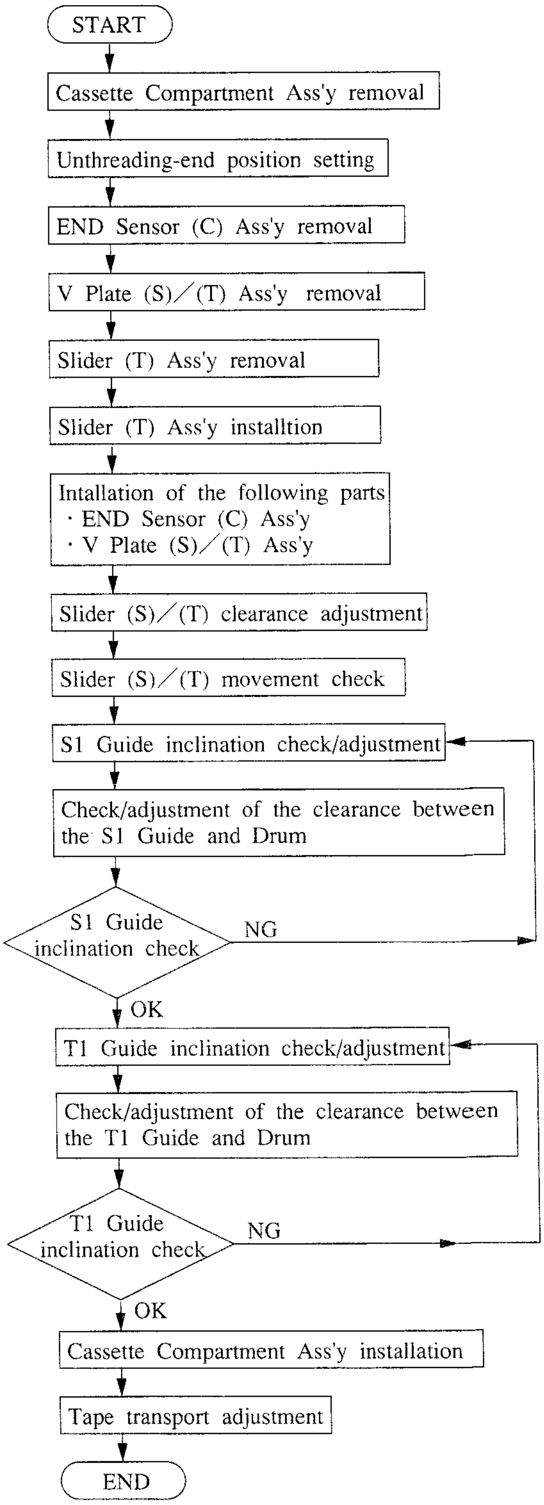
Fig. 6-14-1 Slider (T) Ass'y

6-14-1. Slider (T) Ass'y Replacement

Basic Knowledge

A. Dismount the following parts before replacing the Slider (T) Ass'y.
- Cassette Compartment Ass'y
- END Sensor (C) Ass'y
- V Plate (S)/(T) Ass'y

B. Replacement flowchart


START
Cassette Compartment Ass'y removal
Unthreading-end position setting
END Sensor (C) Ass'y removal
V Plate (S)/(T) Ass'y removal
Slider (T) Ass'y removal
Slider (T) Ass'y installtion
Intallation of the following parts
· END Sensor (C) Ass'y
· V Plate (S)/(T) Ass'y
Slider (S)/(T) clearance adjustment
Slider (S)/(T) movement check
S1 Guide inclination check/adjustment
Check/adjustment of the clearance between the S1 Guide and Drum
S1 Guide inclination check
NG
OK
T1 Guide inclination check/adjustment
Check/adjustment of the clearance between the T1 Guide and Drum
T1 Guide inclination check
NG
OK
Cassette Compartment Ass'y installation
Tape transport adjustment
END

Replacement

1. Cassette Compartment Ass'y removal
   Refer to Section 6-5.
   Unthreading-end position setting
   Refer to Section 6-(1).

2. END Sensor (C) Ass'y removal (Fig. 6-14-2)
   - Remove the screw which fixes the END sensor (C) Ass'y and then remove the END Sensor (C) Ass'y.

3. V Plate (S)/(T) Ass'y removal (Fig. 6-14-2)
   (1) Remove the two connectors (CN831, CN832) shown in the figure.
   (2) Remove the two screws (C 3×16) which fix the V Plate (S)/(T) Ass'y and then remove the V Plate (S)/(T) Ass'y.
   Use a hexagonal wrench (across flats of 2.5 mm).

Note: When removing the ass'y, check the thickness and the number of V Spacers mounted. When the ass'y is installed, the same number of V spacers in the same thickness as were removed must be mounted.

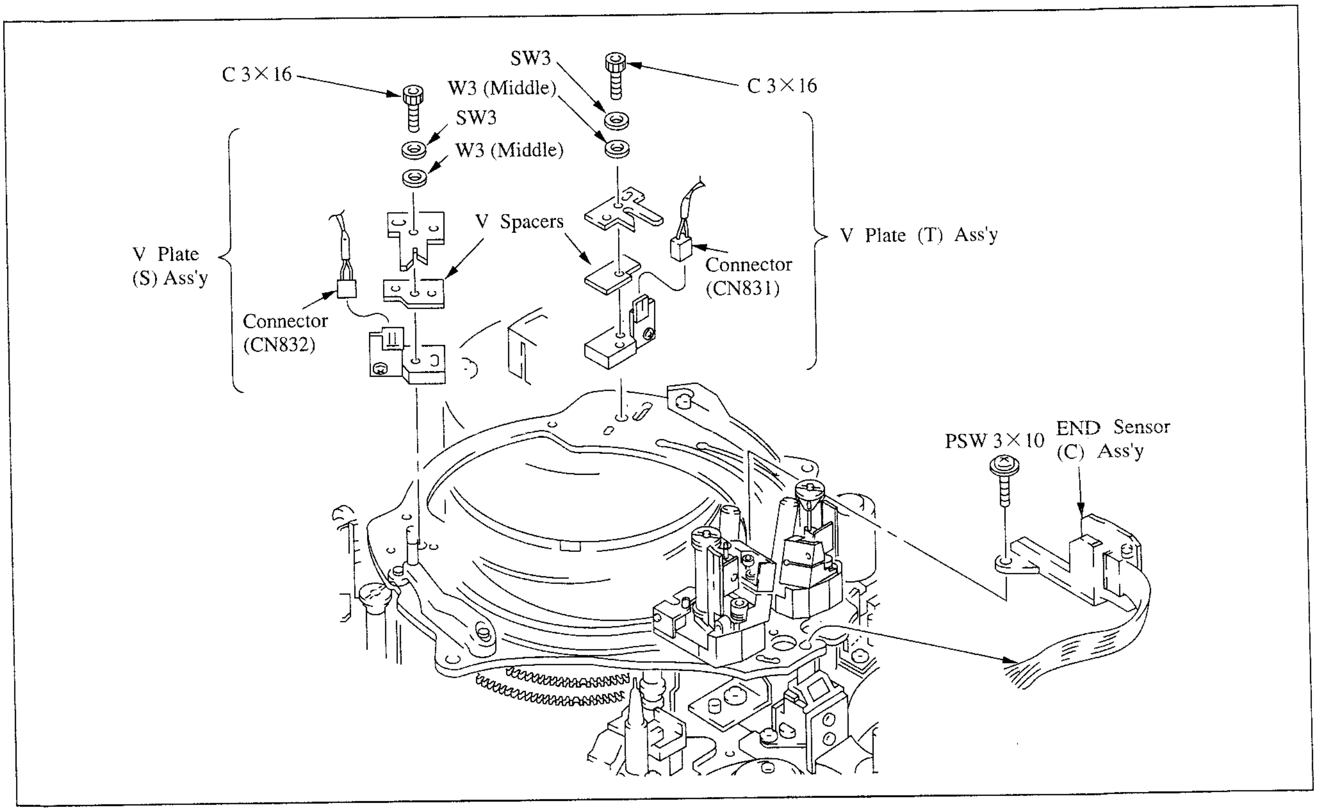

C 3×16
SW3
W3 (Middle)
C 3×16
SW3
W3 (Middle)
V Spacers
V Plate (S) Ass'y
Connector (CN831)
V Plate (T) Ass'y
Connector (CN832)
PSW 3×10
END Sensor (C) Ass'y

Fig. 6-14-2 V Plate (S)/(T) Ass'y Removal

4. Slider (T) Ass'y removal (Fig. 6-14-3)
   (1) Remove the two screws which fix the LD Rail.
   (2) Move section A of the LD Rail up 8 mm to 10 mm and move the Slider (T) Ass'y in the direction of the arrow B to remove it.

   Note: (1) Do not deform the LD Rail by applying excessive forces to it. Work with a sufficient care.
   (2) As Molyton grease is smeared to the Guide Shaft of the Slider (S) Ass'y, take care so as not to smear Molyton grease to another portion.

5. Slider (T) Ass'y Installation (Fig. 6-14-3)
   (1) Clean the sliding surface of the LD Rail and the sliding surface (bottom) of the Slider (T) Ass'y with a cloth moistened with cleaning liquid.
   Be sure to wipe it with a dry cloth 2 or 3 times after cleaning.
   (2) Move section A of the LD Rail up 8 mm to 10 mm and install a new Slider (T) Ass'y on the LD Rail in the reverse order of step 4.
   (3) Smear a small amount of Molyton grease to the holes of the S and T links, and insert the Guide Shafts of the Slider (S)/(T) Ass'y shown in the figure into the holes of the S and T links.
   (4) Fix the LD Rail with two screws.

   Note: In fixing the LD Rail, turn it in the arrow direction C to eliminate the play.

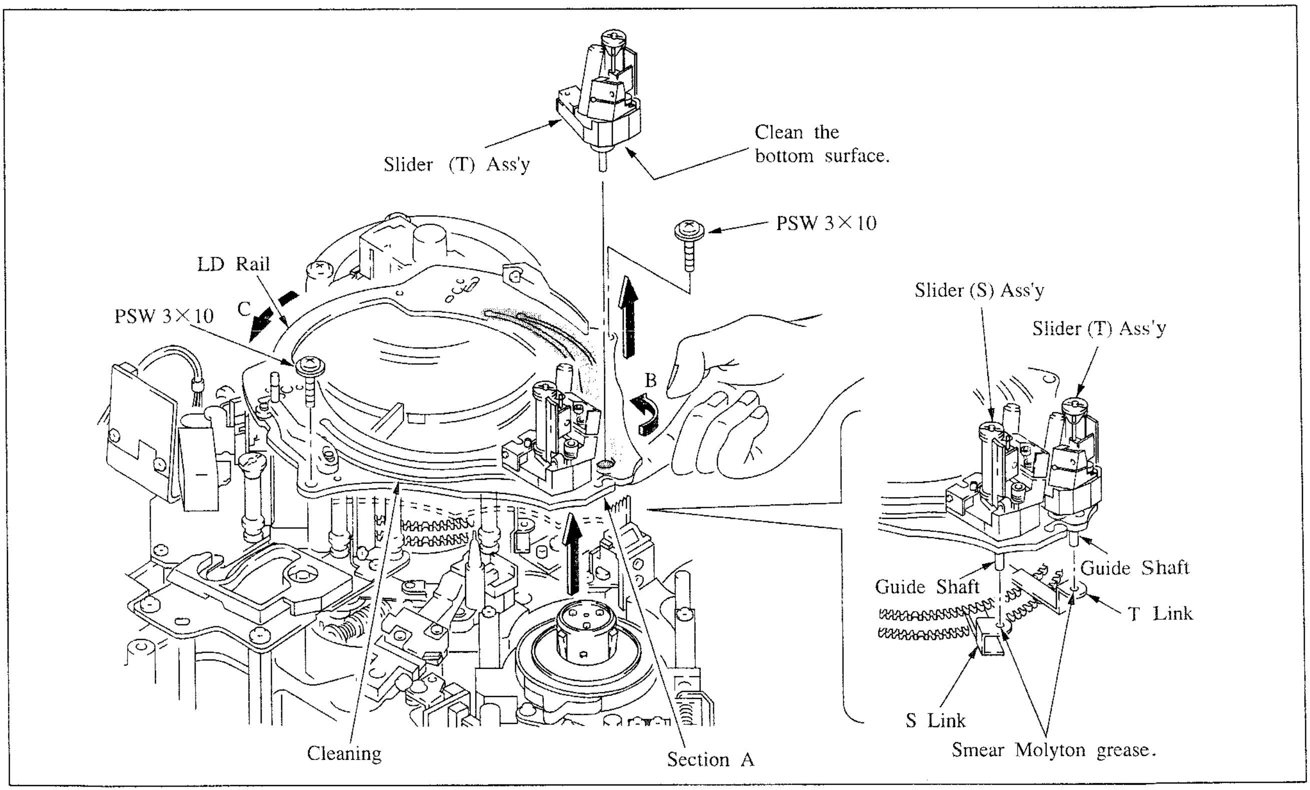

Slider (T) Ass'y
Clean the bottom surface.
PSW 3×10
LD Rail
PSW 3×10
C
B
Slider (S) Ass'y
Slider (T) Ass'y
Guide Shaft
Guide Shaft
T Link
S Link
Smear Molyton grease.
Cleaning
Section A

Fig. 6-14-3 Slider (T) Ass'y Replacement

6. Install the following parts:
   - END Sensor (C) Ass'y
   - V Plate (S)/(T) Ass'y

   Reverse the procedures of steps 2 and 3.

Adjustment

7. Perform the following adjustments.
   (i) Slider (S)/(T) clearance adjustment
   (ii) Slider (S)/(T) movement check
   (iii) S1 Guide inclination check/adjustment
   (iv) Check/adjustment of the clearance between the S1 Guide and Drum
   (v) T1 Guide inclination check/adjustment
   (vi) Check/adjustment of the clearance between the T1 Guide and Drum

   Refer to Section 6-15.
   After making the above adjustments, check the S1 Guide inclination and the T1 Guide inclination again to make sure that the specifications are satisfied. If they are not satisfied, repeat the adjustment from (iii).

8. Cassette Compartment installation.
   Refer to Section 6-5.

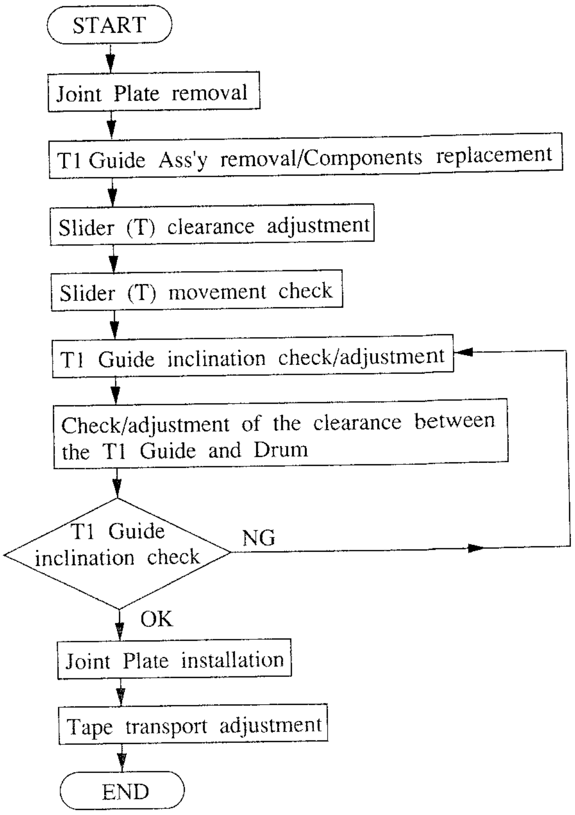
9. Tape transport adjustment.
   Refer to Section 9.

6-14-2. T1 Guide Ass'y Replacement

Basic Knowledge

A. Dismount the Joint Plate before replacing the T1 Guide Ass'y.
   Cassette Compartment Ass'y removal and Unthreading-end position setting have been already carried out as same procedure as Section 6-14-1.

B. Replacement flowchart


START
Joint Plate removal
T1 Guide Ass'y removal/Components replacement
Slider (T) clearance adjustment
Slider (T) movement check
T1 Guide inclination check/adjustment
Check/adjustment of the clearance between the T1 Guide and Drum
T1 Guide inclination check
NG
OK
Joint Plate installation
Tape transport adjustment
END

Replacement

1. Joint Plate removal (Fig. 6-14-4)
   (1) Dismount the Joint Plate by removing the two screws which fix the Joint Plate.
   (2) Lift the USE Ass'y in the arrow direction by pushing the lever shown in the figure in the arrow direction.

2. T1 Guide replacement (Fig. 6-14-5)
   (1) Dismount the T1 Guide Holder together with the T1 Guide by removing the screw ① which fixes the T1 Guide Holder. Use a hexagonal wrench (across flats of 2 mm).
   (2) Dismount the T1 Guide from the T1 Guide Holder by removing the screw ② which fixes the guide. Use a hexagonal wrench (across flats of 1.5 mm).

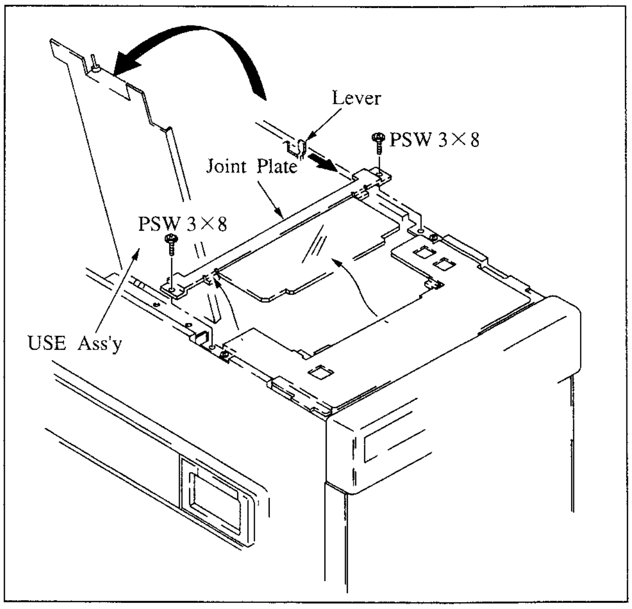

Lever
PSW 3×8
Joint Plate
PSW 3×8
USE Ass'y

Fig. 6-14-4 Joint Plate Removal

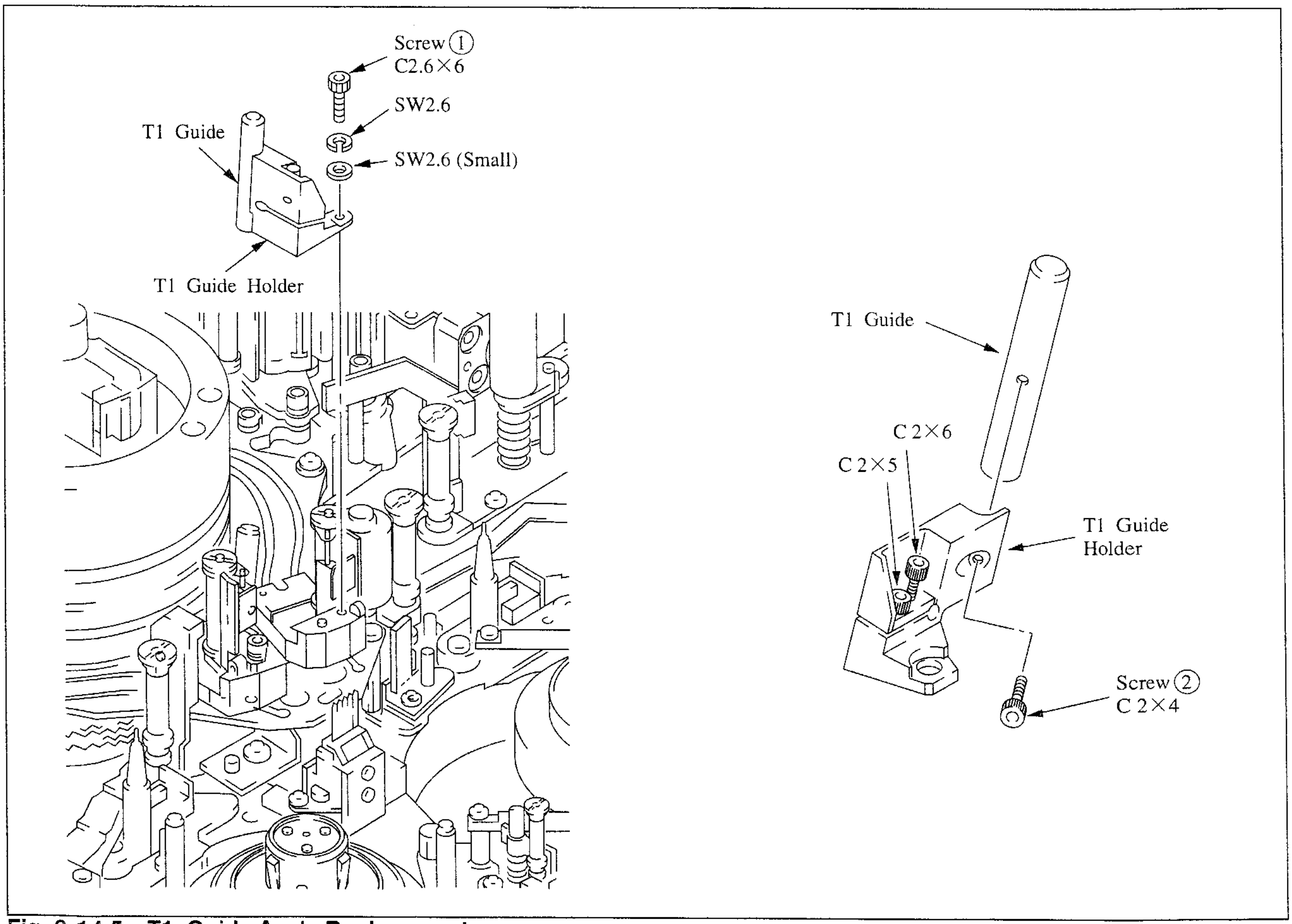

Screw ①
C2.6×6
SW2.6
T1 Guide
SW2.6 (Small)
T1 Guide Holder
T1 Guide
C 2×6
C 2×5
T1 Guide Holder
Screw ②
C 2×4

Fig. 6-14-5 T1 Guide Ass'y Replacement

(3) T1 Guide installation

Install the T1 Guide to the T1 Guide Holder by reversing the procedure of step (2).
Use a hexagonal wrench (across flats of 1.5 mm).
Tightened torque: 39.2×10^{-2} N·m (4 kgf·cm)

Install the T1 Guide Holder by reversing the procedure of step (1).
Use a hexagonal wrench (across flats of 2.5 mm)
Tightened torque: 58.8×10^{-2} N·m (6 kgf·cm)

Note: In mounting the parts, clean the mounting surfaces with a cleaning piece which is moistened with cleaning liquid. Be sure to wipe them with a dry cloth 2 or 3 times after cleaning.

Adjustment

3. Make the following adjustments.
   (i) Slider (T) clearance adjustment
   (ii) Slider (T) movement check
   (iii) T1 Guide inclination check/adjustment
   (iv) Check/adjustment of the clearance between the T1 Guide and Drum

   Refer to Section 6-15.
   Finally, check the T1 Guide inclination again to make sure that the specification is satisfied. If it is not satisfied, repeat (iii) and (iv).
   After making the adjustment, apply locking compound to the head of the screws which fix the T1 Guide and the T1 Guide Holder.

4. Joint Plate installation
   Reverse the step 1 procedure.

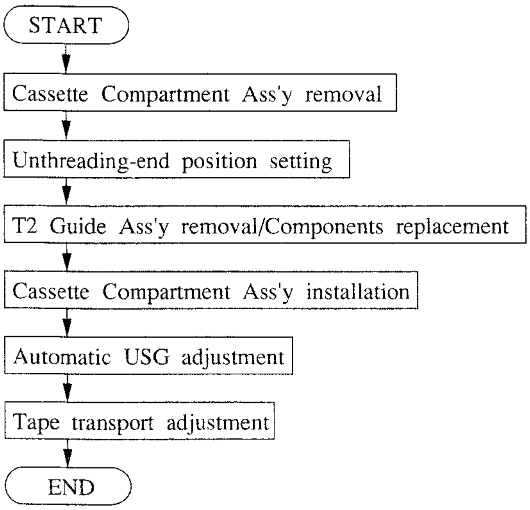
5. Tape transport adjustment
   Refer to Section 9.

6-14-3. T2 Guide Ass'y Replacement

Basic Knowledge

A. Dismount the Cassette Compartment Ass'y before replacing the T2 Guide Ass'y.

B. Replacement flowchart


START
Cassette Compartment Ass'y removal
Unthreading-end position setting
T2 Guide Ass'y removal/Components replacement
Cassette Compartment Ass'y installation
Automatic USG adjustment
Tape transport adjustment
END

Replacement

1. Cassette Compartment Ass'y removal
   Refer to Section 6-5.

2. Unthreading-end position setting (Fig. 6-14-6)
   Refer to Section 6-(1).

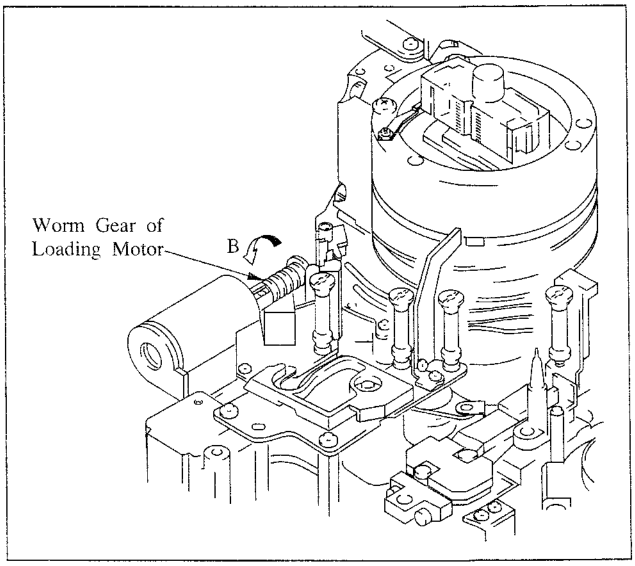

Worm Gear of
Loading Motor
B

Fig. 6-14-6 Unthreading-End Position Setting

3. T2 Guide Ass'y removal/Components replacement
   1. (1) Dismount the two harnesses from the UD-3 Board shown in the figure using a soldering iron.
   2. (2) Dismount the UD-3 Board from the Actuator Holder by removing the screw which fixes the board.
   3. (3) Dismount the components of the T2 Guide Ass'y by removing the Flange Retainer.

      Note: The setscrew of the Flange Retainer already controls the T2 Guide height. Do not turn it unless necessary.

   4. (4) Replace the components that must be replaced.

      Note: Solder the harnesses as illustrated in Fig. 6-14-7, Fig.1.

   5. (5) Mount the T2 Guide Ass'y by reversing the procedures of steps (1) through (3).

      Note: After mounting the T2 Guide Ass'y, make sure that there is a clearance between the Upper Flange and the Actuator Ass'y.

4. Cassette Compartment Ass'y installation
   Refer to Section 6-5.

Adjustment

5. Automatic USG adjustment
   Refer to Section 10.

6. Tape transport adjustment
   Refer to Section 9.

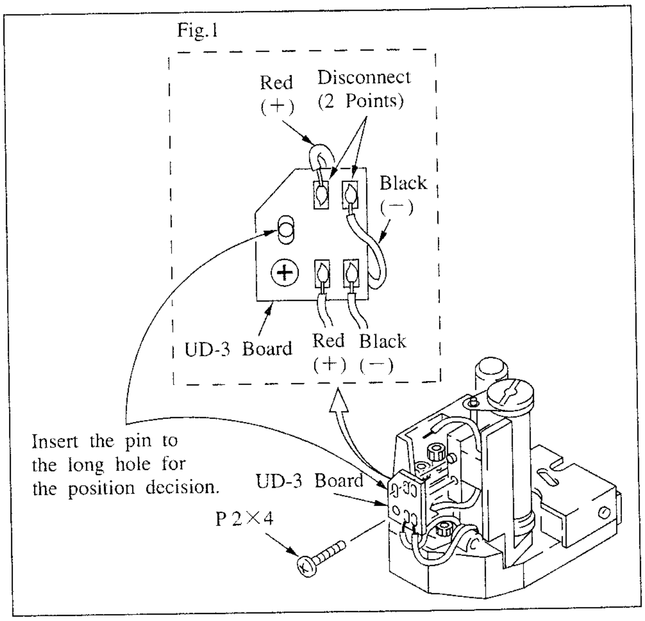


Fig.1
Red (+)
Disconnect (2 Points)
Black (−)
UD-3 Board
Red Black
(+) (−)
Insert the pin to the long hole for the position decision.
UD-3 Board
P 2×4

Fig. 6-14-7 UD-3 Board Removal

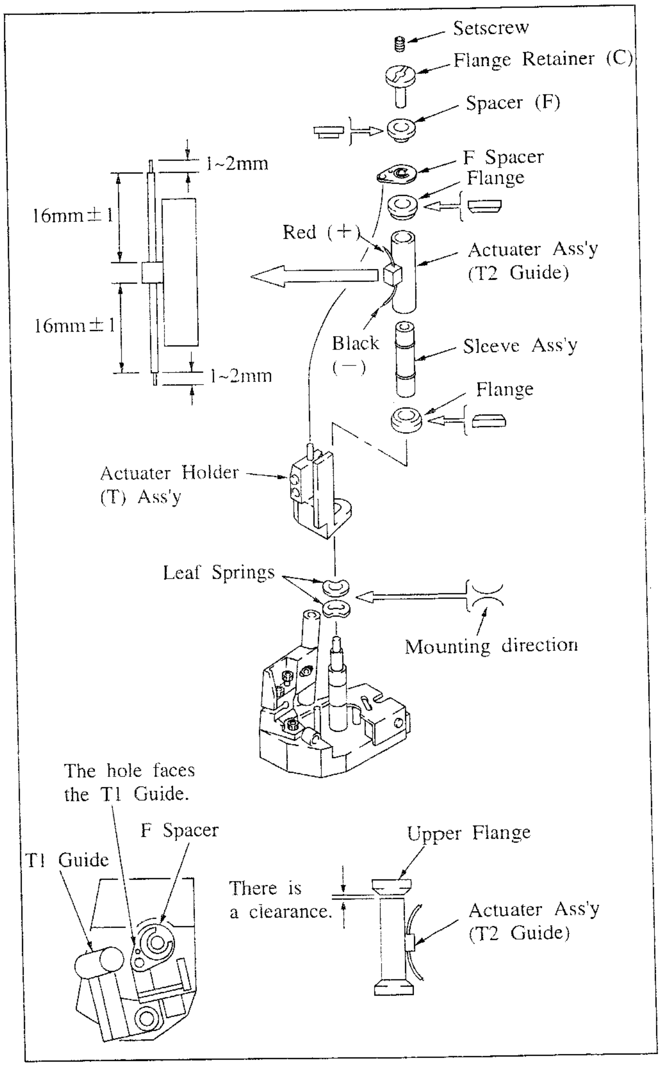

Setscrew
Flange Retainer (C)
Spacer (F)
F Spacer
Flange
1~2mm
16mm±1
16mm±1
1~2mm
Red (+)
Actuater Ass'y (T2 Guide)
Black (−)
Sleeve Ass'y
Flange
Actuater Holder (T) Ass'y
Leaf Springs
Mounting direction
The hole faces the T1 Guide.
F Spacer
T1 Guide
Upper Flange
There is a clearance.
Actuater Ass'y (T2 Guide)

Fig. 6-14-8 T2 Guide Ass'y Replacement

6-14-4. UD-5 Board Replacement

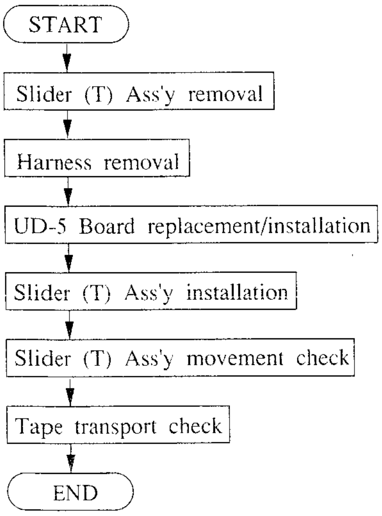
Basic Knowledge

A. The UD-5 board is mounted on the Slider (T) Ass'y. There are two contacts between the UD-5 Board and the CN-625 Board of the V Plate (T) Ass'y. Usually, these boards are both replaced together at the time of periodic replacement (7500 hrs) of the Slider (T) Ass'y. However, if the board contact is worn out excessively and needs to be replaced, a single board can be replaced alone.

B. Remove the Slider (T) Ass'y from the LD Rail to replace the board. Refer to Section 6-14. "Slider (T) Ass'y Replacement" for the removal/installation procedure.

C. There are no adjustments required after the installation of the board. However, the movement of the Slider (T) must be checked after the replacement of the board and the installation of the Slider (T) Ass'y.

D. Replacement flowchart


START
Slider (T) Ass'y removal
Harness removal
UD-5 Board replacement/installation
Slider (T) Ass'y installation
Slider (T) Ass'y movement check
Tape transport check
END

Replacement

1. Slider (T) Ass'y removal
   Refer to Section 6-14-1.

2. Harness removal (Fig. 6-14-9)
   (1) Using a soldering iron, disconnect the two harnesses from the UD-5 Board of the Slider (T) Ass'y as shown in the figure.
   (2) Remove the screw that holds the Cover (T) and then remove the Cover (T).

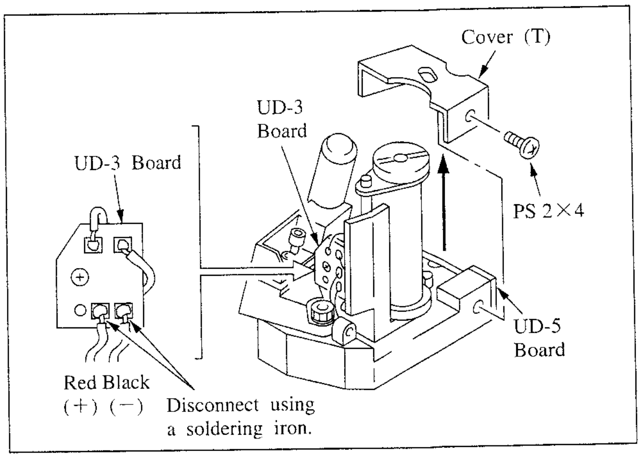

Cover (T)
UD-3 Board
UD-3 Board
PS 2×4
UD-5 Board
Red Black
(+) (−)
Disconnect using a soldering iron.

Fig. 6-14-9 Harness removal

3. UD-5 Board replacement/installation (Fig. 6-14-10)
   (1) Remove the screw fixing the UD-5 Board, then take out the board.
   (2) Pass the harnesses of a new UD-5 Board to the top through the harness guide groove at the back of the Slider (T) Ass'y.
   (3) Solder the harnesses to the UD-3 Board; one at the red side and the other at the black side.
   (4) Mount the UD-5 Board on the Slider (T) Ass'y and fix the board with a screw. Set the harnesses in the harness guide groove.

   Note: Check that the harnesses are not sticking out from the harness guide groove after installation of the UD-5 Board.

   (5) Press the Cover (T) in the direction of arrow A shown in fig. 6-14-10, and mount the Cover (T) on the Slider (T) Ass'y and fix the cover with a screw.

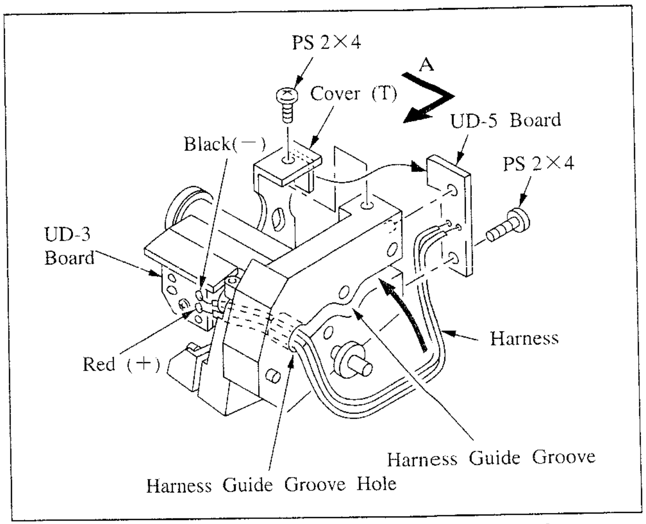

PS 2×4
A
Cover (T)
UD-5 Board
Black(−)
PS 2×4
UD-3 Board
Harness
Red (+)
Harness Guide Groove
Harness Guide Groove Hole

Fig. 6-14-10 UD-5 Board Replacement/Installation

4. Slider (T) Ass'y installation
   Refer to Section 6-14-1.

5. Slider (T) Ass'y movement check
   Refer to Section 6-15-2.

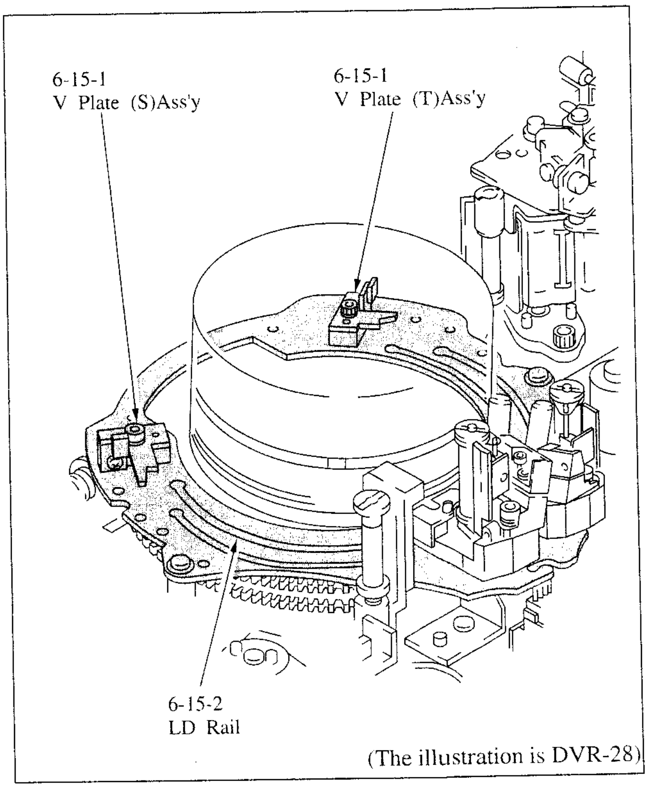
6. Tape transport check
   Refer to Section 9.

6-15. LD RAIL ASS'Y COMPONENT REPLACEMENT

Basic Knowledge

A. The LD Rail Ass'y is shown in Fig. 6-15-1.
The replacement methods for the following parts are explained in this section.
6-15-1. V Plate (S)/(T) Ass'y Replacement
6-15-2. LD Rail Replacement

B. Prepare the following tools.
- Molyton grease
  Sony Parts No. : 7-662-001-41
- Slider Position Confirm spacer
  Sony Parts No. : J-6254-680-A
- Thickness gauge
  Sony Parts No. : J-6041-670-A
- Confidence Head Adjustment Plate
  Sony Parts No. : J-6257-140-A
- Cleaning liquid (or the equivalent)
  Sony Parts No. : 9-919-573-00


6-15-1
V Plate (S)Ass'y
6-15-1
V Plate (T)Ass'y
6-15-2
LD Rail

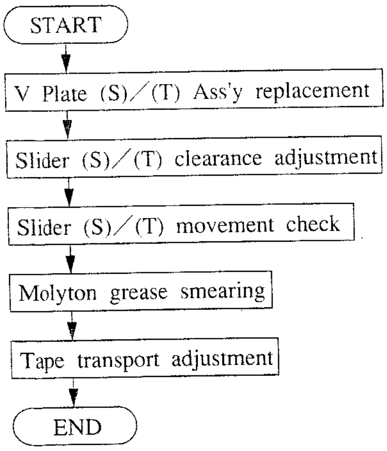
(The illustration is DVR-28)

Fig. 6-15-1 LD Rail Ass'y

6-15-1. V Plate (S)/(T) Ass'y Replacement

Basic Knowledge

- Replacement flowchart


START
V Plate (S)/(T) Ass'y replacement
Slider (S)/(T) clearance adjustment
Slider (S)/(T) movement check
Molyton grease smearing
Tape transport adjustment
END

Replacement

1. V Plate (S)/(T) Ass'y replacement (Fig. 6-15-2)
   (1) Remove the connectors shown in the figure. (CN831, CN832)
   (2) Remove the two screws securing the V Plate (S)/(T) Ass'y, and then remove the components of the V Plate (S)/(T) Ass'y.
   Replace the necessary components.
   Use a hexagonal wrench (across flats of 2.5 mm).
   Tightened torque: 78.4×10^{-2} N·m (8 kgf·cm)

Note 1 : When removing the ass'y, check the thickness and the number of V Spacers mounted.
When the ass'y is installed, the same number of V Spacers in the same thickness as were removed must be mounted.

Note 2 : If the CN-565 or CN-625 Board need to be replaced, to prevent USG malfunction due to bad contact, fix the CN-565 or CN-625 Board to the V Block, following the directions indicated by the arrows shown in Fig. 1.

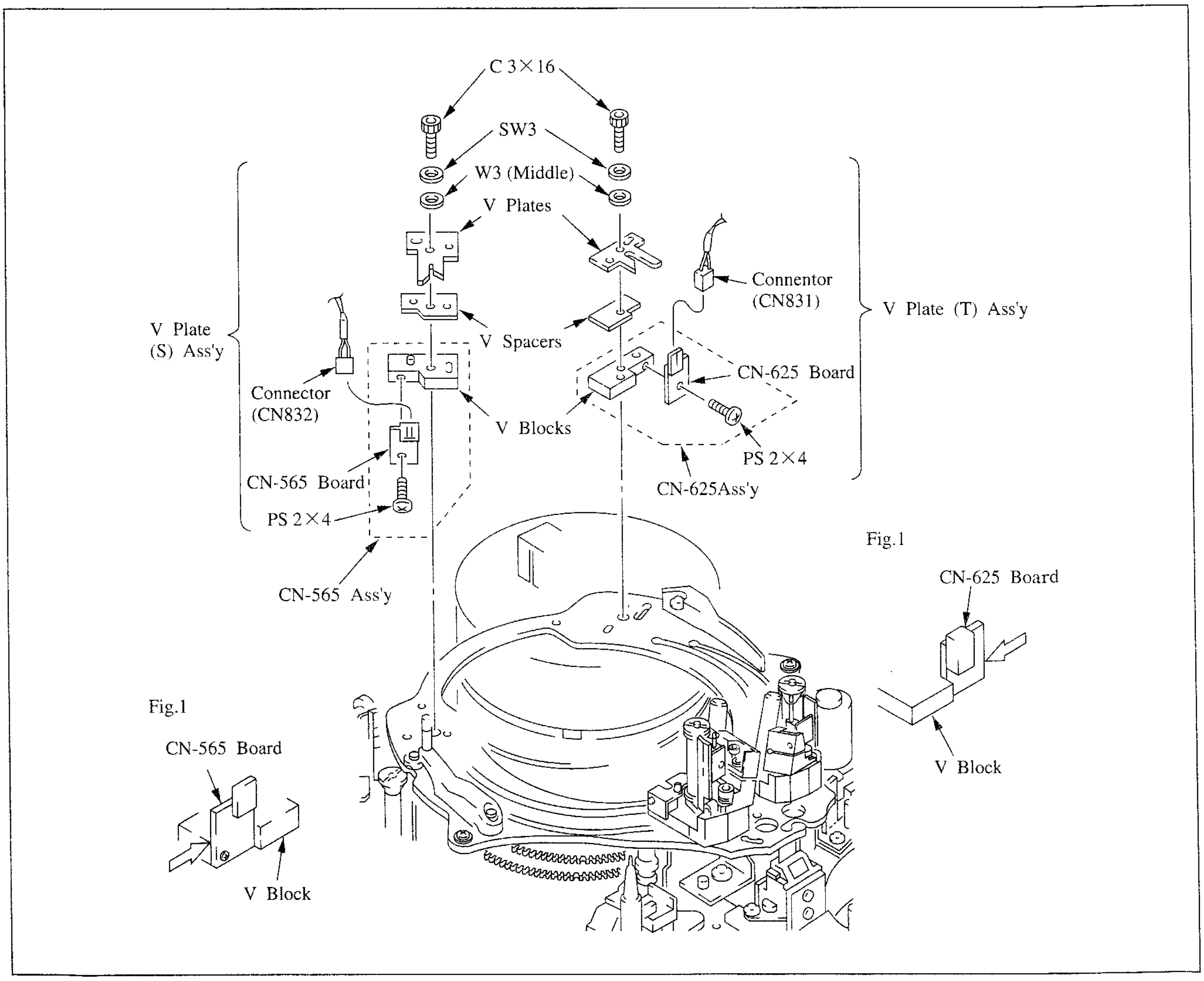

C 3×16
SW3
W3 (Middle)
V Plates
Connentor
(CN831)
V Plate (T) Ass'y
V Plate
(S) Ass'y
V Spacers
CN-625 Board
Connector
(CN832)
V Blocks
PS 2×4
CN-565 Board
CN-625Ass'y
PS 2×4
Fig.1
CN-625 Board
CN-565 Ass'y
Fig.1
CN-565 Board
V Block
V Block

Fig. 6-15-2 V Plate (S)/(T) Ass'y Replacement

Adjustment

2. Slider (S)/(T) clearance adjustment
   Refer to Step 9 of Section 6-15-2.
   - When the V Plate (S) Ass'y is replaced, the slider (S) clearance must be adjusted.
   - When the V Plate (T) Ass'y is replaced, the slider (T) clearance must be adjusted.

3. Slider (S)/(T) movement check
   Refer to Step 10 of Section 6-15-2.
   - When the V Plate (S) Ass'y is replaced, the slider (S) movement must be checked.
   - When the V Plate (T) Ass'y is replaced, the slider (T) movement must be checked.

4. Molyton grease smearing (Fig. 6-15-3)
   - Smear a small amount of Molyton grease to the portion (steel ball) shown in the figure.

   Note : Never smear Molyton grease to the top surface of the cover and the UD-4/5 boards. When Molyton grease is stuck to them, be sure to wipe it off.

5. Tape transport adjustment
   Refer to Section 9.

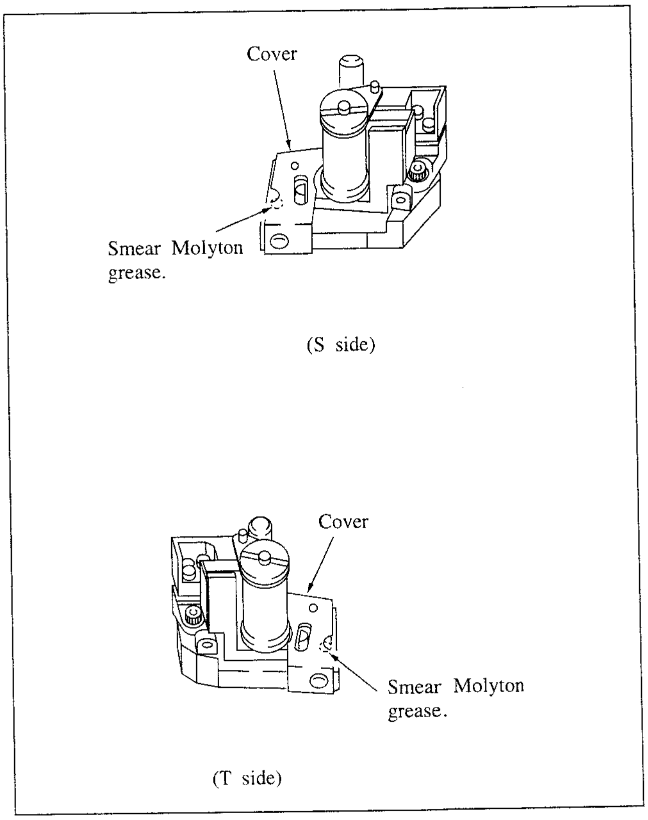


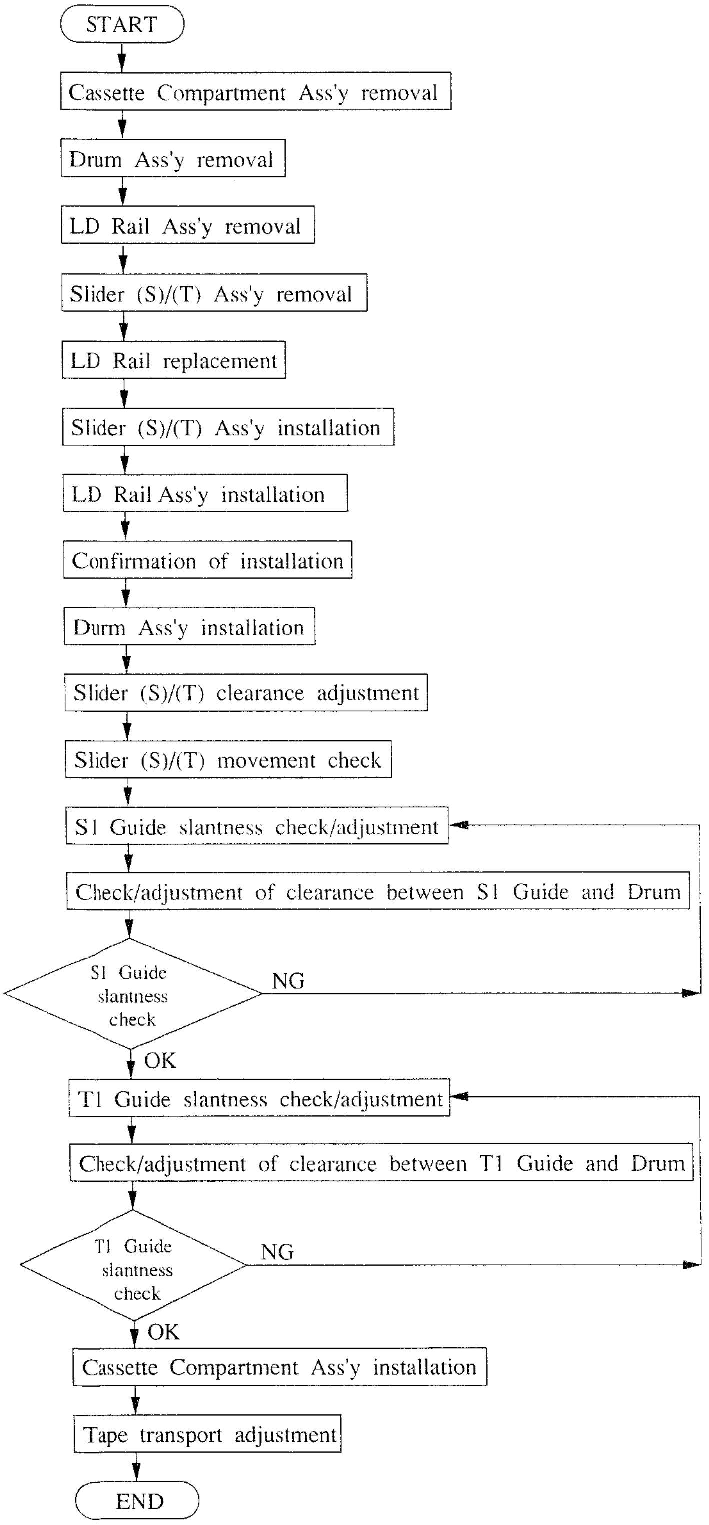
Fig. 6-15-3 Molyton Grease Smearing

6-15-2. LD Rail Replacement

Basic Knowledge

A. Remove the following components before replacement:
- Cassette Compartment Ass'y
- Drum Ass'y

B. Replacement flowchart


START
Cassette Compartment Ass'y removal
Drum Ass'y removal
LD Rail Ass'y removal
Slider (S)/(T) Ass'y removal
LD Rail replacement
Slider (S)/(T) Ass'y installation
LD Rail Ass'y installation
Confirmation of installation
Durm Ass'y installation
Slider (S)/(T) clearance adjustment
Slider (S)/(T) movement check
S1 Guide slantness check/adjustment
Check/adjustment of clearance between S1 Guide and Drum
S1 Guide slantness check
NG
OK
T1 Guide slantness check/adjustment
Check/adjustment of clearance between T1 Guide and Drum
T1 Guide slantness check
NG
OK
Cassette Compartment Ass'y installation
Tape transport adjustment
END

Removal

1. Cassette Compartment Ass'y removal
   Refer to Section 6-5.

2. Drum Ass'y removal
   Refer to Section 6-2.

3. LD Rail Ass'y removal (Fig. 6-15-4)
   (1) Remove the two connectors (CN831, CN832) shown in the figure.
   (2) Remove the two screws (① and ②) securing the V Plate (S)/(T) Ass'y shown in the figure and then remove the V Plate (S)/(T) Ass'y.
   Use a hexagonal wrench (across flat of 2.5 mm).

   Note : When removing the ass'y, check the thickness and the number of V Spacers mounted.
   When the ass'y is installed, the same number of V Spacers in the same thickness as were removed must be mounted.

   (3) Remove the screw ③ securing the END Sensor (C) Ass'y and then remove the END Sensor (C) Ass'y.
   (It is not necessary to remove connector CN316.)
   (4) Remove two screws (④ and ⑤) securing the LD Rail A'ssy and then remove the LD Rail Ass'y from the Drum Base.
   (5) Remove two screws (⑥ and ⑦) fixing the Tape Protector (S), then remove the Tape Protector (S).
   (6) Remove the screw ⑧ fixing the Tape Protector (T), then remove the Tape Protector (T).

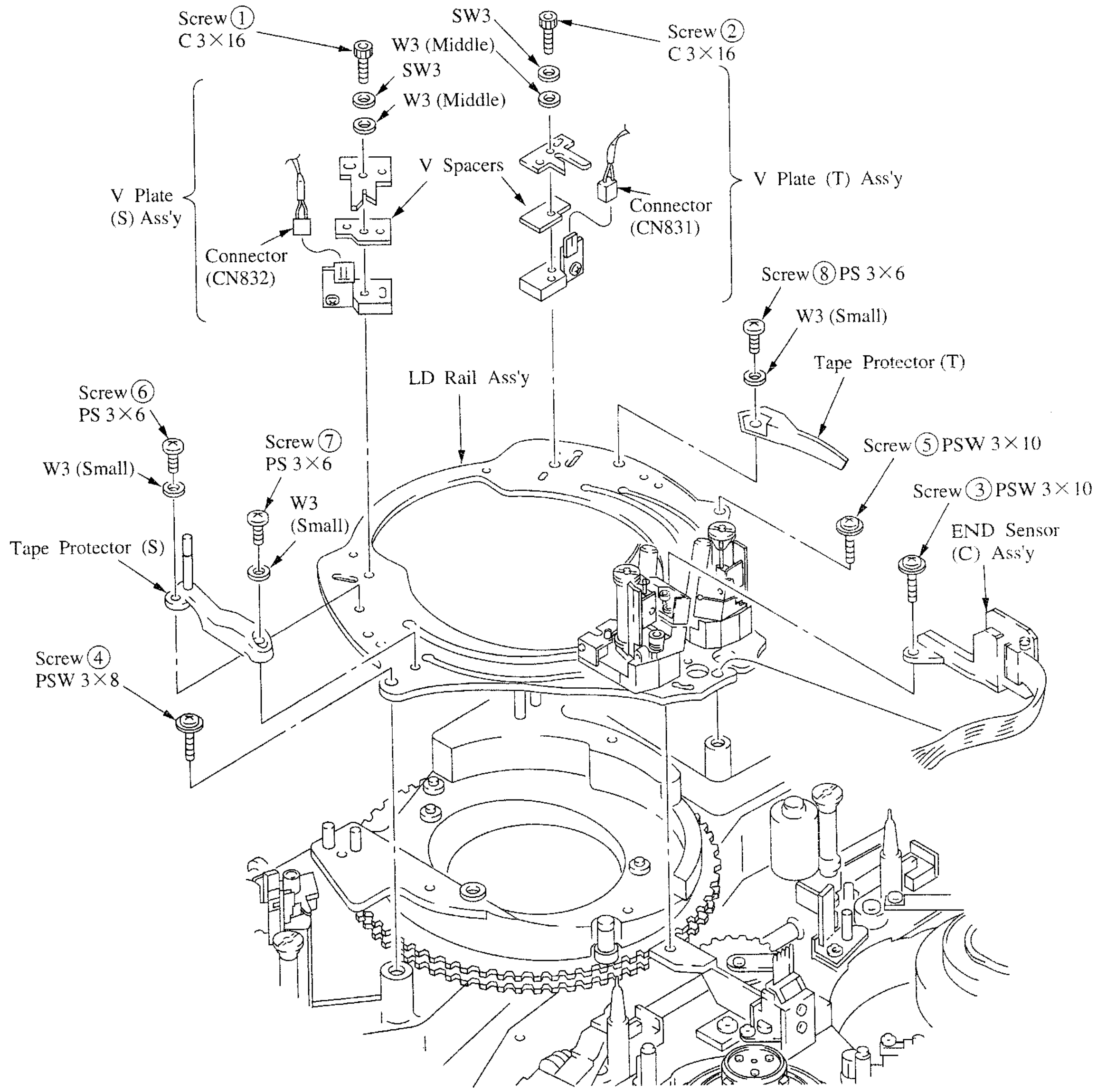

Screw①
C 3×16
SW3
W3 (Middle)
SW3
W3 (Middle)
Screw②
C 3×16
V Spacers
V Plate (S) Ass'y
Connector (CN832)
Connector (CN831)
V Plate (T) Ass'y
Screw⑧PS 3×6
W3 (Small)
Tape Protector (T)
LD Rail Ass'y
Screw⑥
PS 3×6
W3 (Small)
Screw⑦
PS 3×6
W3 (Small)
Tape Protector (S)
Screw④
PSW 3×8
Screw⑤PSW 3×10
Screw③PSW 3×10
END Sensor (C) Ass'y

Fig. 6-15-4 LD Rail Ass'y Removal

4. Slider (S)/(T) Ass'y removal (Fig. 6-15-5)
   - Remove the Slider (S)/(T) Ass'y shown in the figure by moving it in the direction of the arrow.

Note: As Molyton grease is smeared to the Guide Shaft of the Slider (S) Ass'y, take care so as not to smear Molyton grease to another portion.

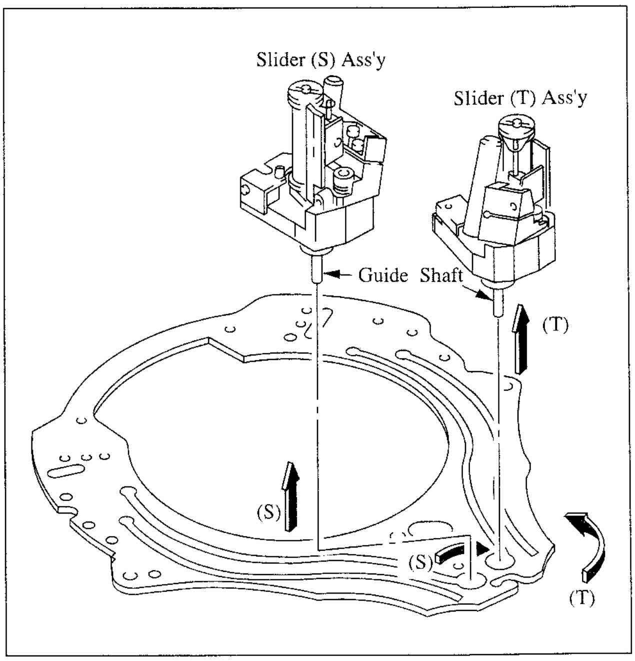

Slider (S) Ass'y
Slider (T) Ass'y
Guide Shaft
(T)
(S)
(S)
(T)

Fig. 6-15-5 Slider (S)/(T) Ass'y Removal

Replacement/Installation

5. Slider (S)/(T) Ass'y installation (Fig. 6-15-6)
   (1) Clean the sliding surfaces of the Slider (S)/(T) Ass'y and a new LD Rail Ass'y with a cloth moistened with cleaning liquid.
   Then wipe the cleaned surface with a dry cloth.
   (2) Install the Slider (S)/(T) Ass'y on the new LD Rail in the reverse order of step 4 taking care of the grease on the Guide Shaft.

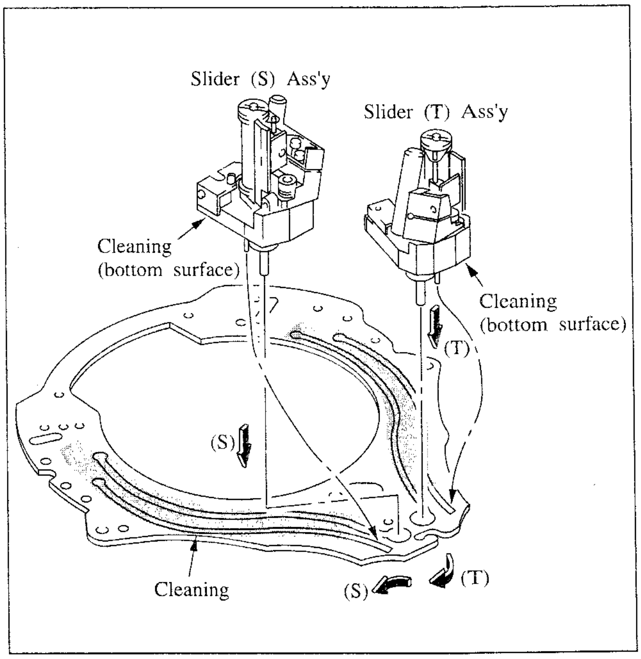

Slider (S) Ass'y
Slider (T) Ass'y
Cleaning
(bottom surface)
Cleaning
(bottom surface)
(T)
(S)
Cleaning
(S)
(T)

Fig. 6-15-6 Slider (S)/(T) Ass'y Installation

6. LD Rail Ass'y installation (Fig. 6-15-7)
   (1) Clean the LD Rail Ass'y and the LD Rail mounting surfaces of the Drum Base and the machine with a cloth moistened with cleaning liquid.
   After cleaning, wipe them with a dry cloth twice or three times.
   (2) Install the LD Rail Ass'y on the Drum Base.
   Before fixing it, smear a small amount of Molyton grease to the holes of the S and T links shown in the figure, and insert the Guide Shafts of the Slider (S)/(T) Ass'y into the holes of the S and T links.

   Note : Take care so as not to smear the grease to another portion.

   (3) Hold the V Plate (S)/(T) Ass'y with two screws.
   When installing the Ass'y, turn the LD Rail in the direction of arrow A (counterclockwise against the Drum Base) to fix it tightly.

   Note : When the ass'y is installed, the same number of V Spacers in the same thickness as were removed must be mounted.

   (4) Fix the LD Rail Ass'y with two screws ③ and ④.
   (5) Connect two connectors (CN831, CN832).
   (6) Install the END Sensor (C) Ass'y by the screw ⑤.
   (7) Fix Tape Protectors (S) and (T).

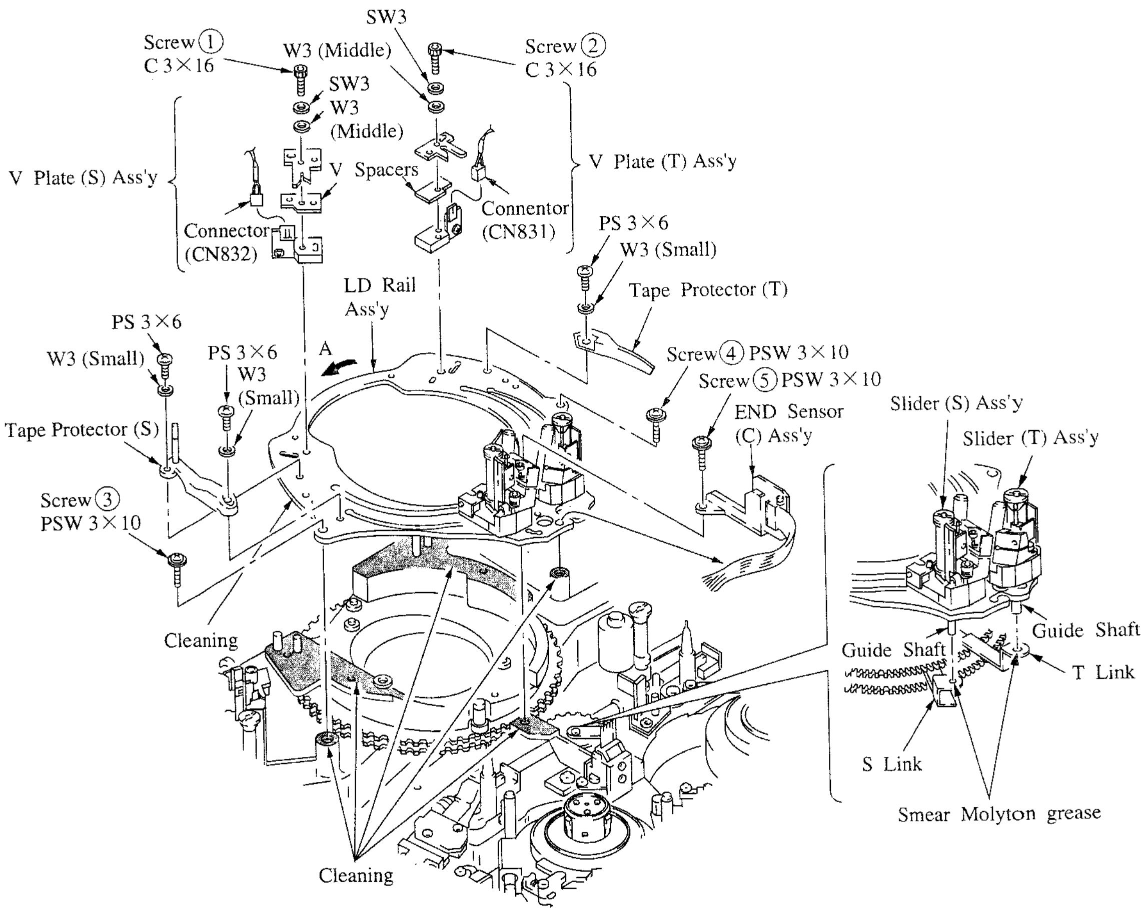

SW3
Screw① C 3×16
W3 (Middle)
Screw② C 3×16
SW3
W3 (Middle)
V Plate (S) Ass'y
V Spacers
V Plate (T) Ass'y
Connector (CN832)
Connentor (CN831)
PS 3×6
W3 (Small)
LD Rail Ass'y
Tape Protector (T)
PS 3×6
W3 (Small)
PS 3×6
W3 (Small)
A
Screw④ PSW 3×10
Screw⑤ PSW 3×10
END Sensor (C) Ass'y
Slider (S) Ass'y
Slider (T) Ass'y
Tape Protector (S)
Screw③ PSW 3×10
Cleaning
Guide Shaft
Guide Shaft
T Link
S Link
Smear Molyton grease
Cleaning

Fig. 6-15-7 LD Rail Ass'y Installation

7. Confirmation of installation (Fig. 6-15-8)
   - Confirm that the Slider (S)/(T) Ass'y moves smoothly by rotating the Worm Gear of the Loading Motor shown in the figure in the directions of A and B.

8. Drum Ass'y installation
   Refer to Section 6-2.

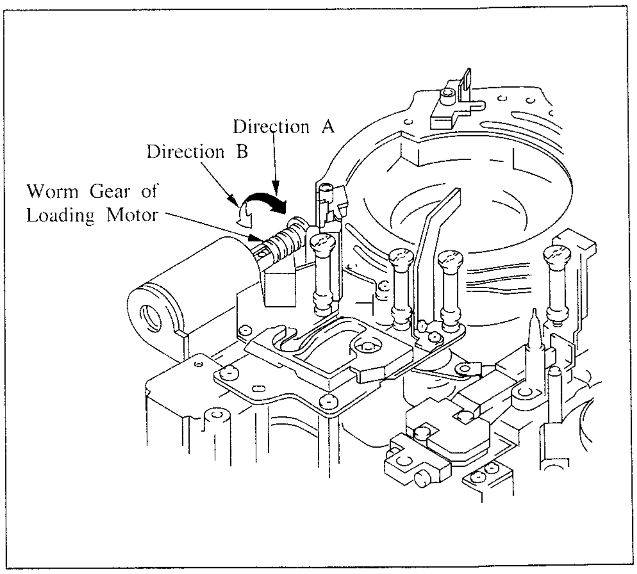

Direction A
Direction B
Worm Gear of Loading Motor

Fig. 6-15-8 Worm Gear of the Loading Motor

Adjustment

9. Slider (S)/(T) clearance adjustment

Preparation

- Turn the Worm Gear of the Loading Motor shown in Fig. 6-15-9 in the direction of arrow A, and securely set it to the threading-end.

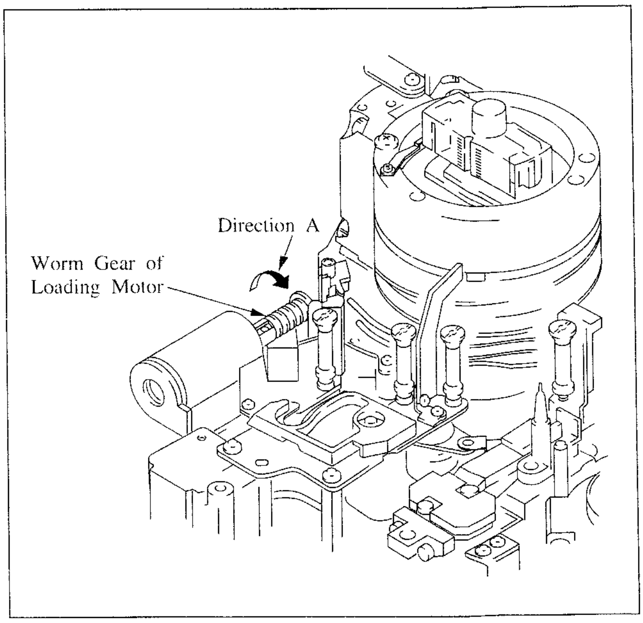

Direction A
Worm Gear of Loading Motor

Fig. 6-15-9 Slider (S)/(T) Clearance Adjustment (1)

Adjustment (Fig. 6-15-10)

- Confirm that the clearance C between the LD Rail and the Slider Base shown in the figure satisfies the specification by using the Slider Position Confirm spacer.

Note : Place the end face of the spacer along the V block.

Specification : Slider Position Confirm spacer
Marking 15 (t : 15µm) goes through.
Marking 25 (t : 25µm) does not go through.

If the clearance does not satisfy the specification, change the thickness and the number of V Spacers so that the clearance satisfies the specification.

[V Spacer]

Thickness (T: µm)	Sony Part Number
t= 5	3-170-941-0X
t=10	3-170-941-1X
t=20	3-170-941-2X
t=30	3-170-941-3X

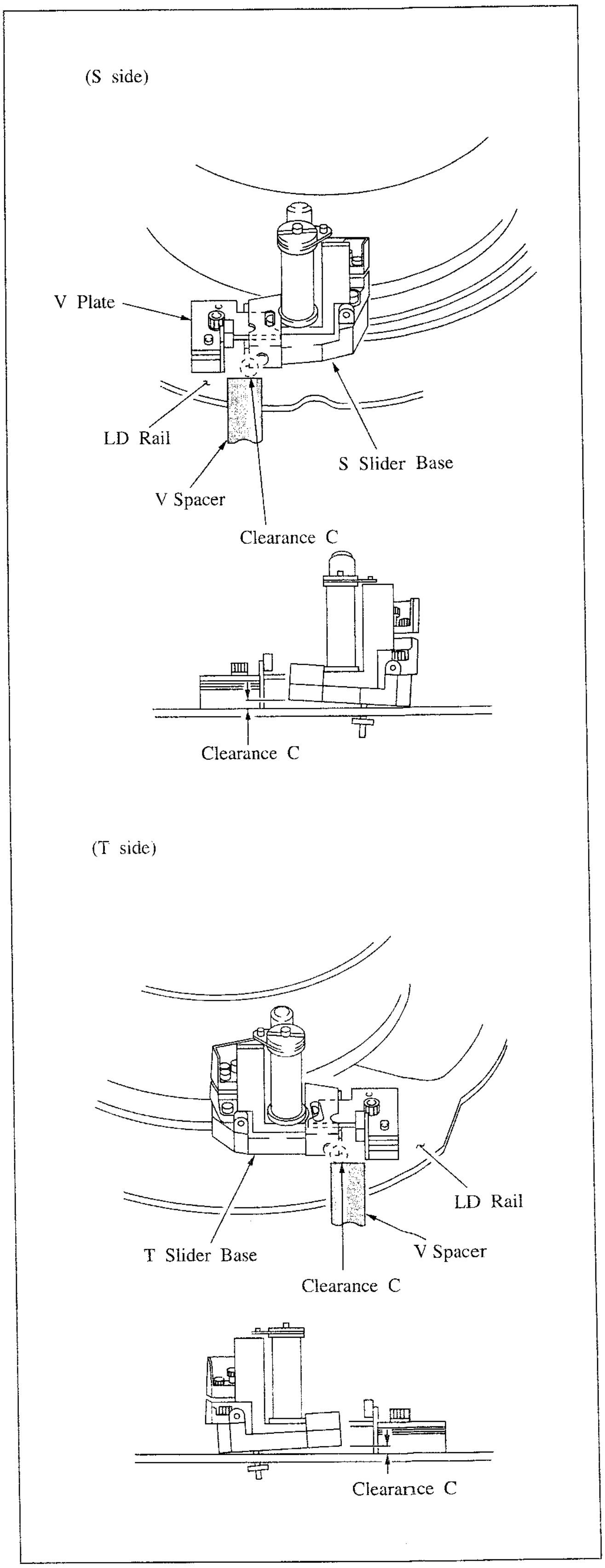

(S side)
V Plate
LD Rail
S Slider Base
V Spacer
Clearance C
Clearance C
(T side)
LD Rail
T Slider Base
V Spacer
Clearance C
Clearance C

Fig. 6-15-10 Slider (S)/(T) Clearance Adjustment (2)

10. Slider (S)/(T) movement check

Preparation

- Turn the Worm Gear of the Loading Motor shown in Fig. 6-15-11 in the direction of arrow A, and securely set it to the threading-end.

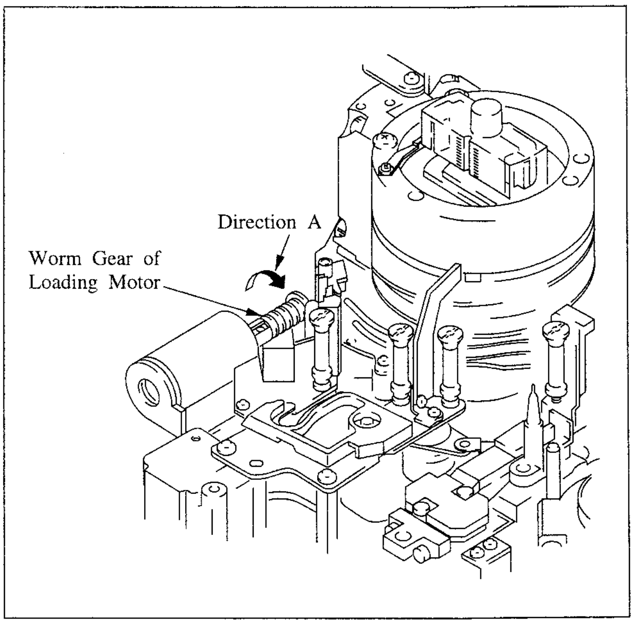

Direction A
Worm Gear of Loading Motor

Fig. 6-15-11 Slider (S)/(T) Movement Check (1)

Check (Fig. 6-15-12)

- Pull the S and T Slider Bases in the directions of arrows D and E respectively and confirm that they return to the threading-end positions by the force of the spring, and confirm that the Slider Pin is contacting both a and b lines at the V Plate with no clearance as shown in Fig. 1.
  If this is not satisfied, perform the Slider (S)/(T) clearance adjustment (step 9) again.

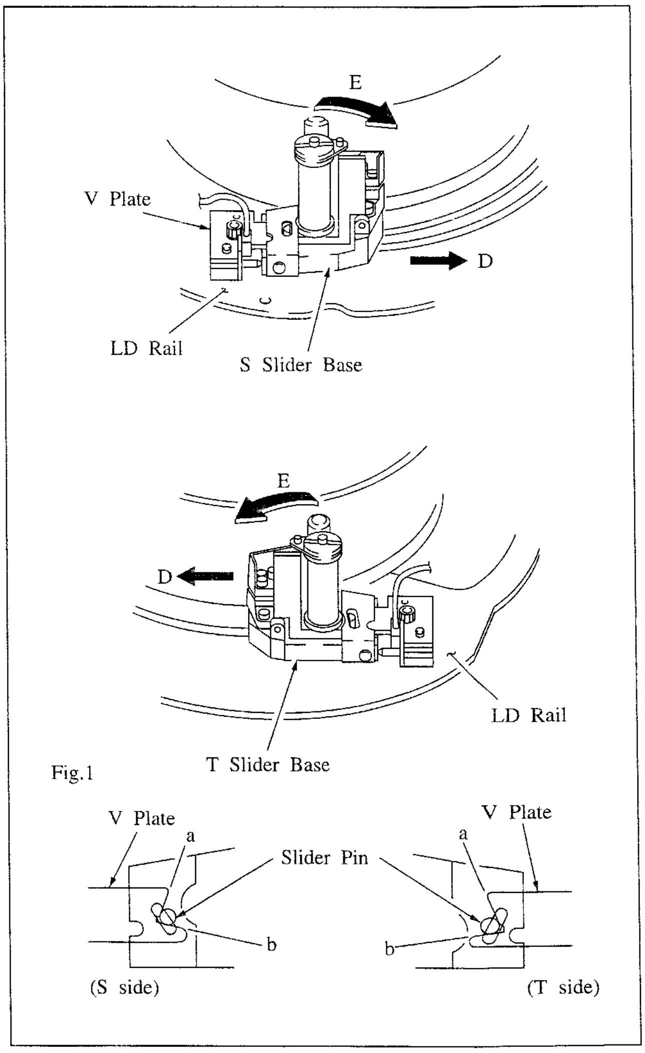

E
V Plate
D
LD Rail
S Slider Base
E
D
LD Rail
T Slider Base
Fig.1
V Plate
a
Slider Pin
V Plate
a
b
b
(S side)
(T side)

Fig. 6-15-12 Slider (S)/(T) Movement Check (2)

11. S1 Guide slantness check/adjustment

Preparation

- Turn the Worm Gear of the Loading Motor shown in Fig. 6-15-13 in the direction of arrow B, and securely set it to the unthreading-end.

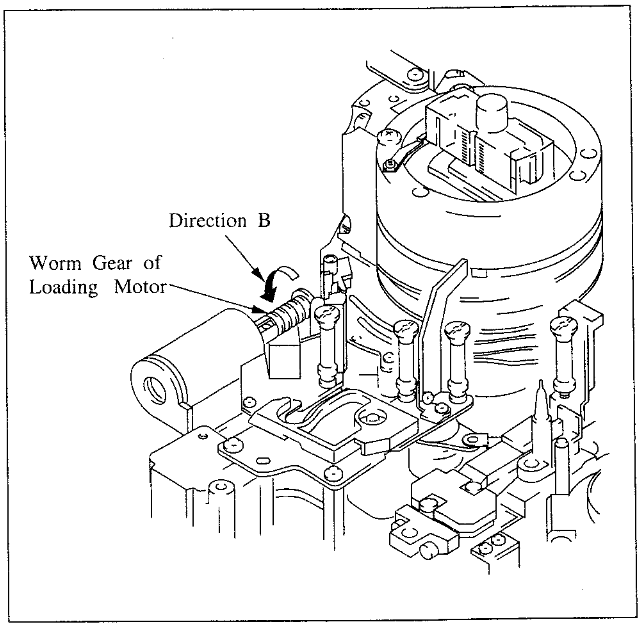

Direction B
Worm Gear of
Loading Motor

Fig. 6-15-13 S1 Guide Slantness Check/Adjustment (1)

Check (Fig. 6-15-14)

(1) Set the Confidence Head Adjustment Plate as shown in the figure. At this time, check that the tilt of the S1 Guide from the S2 Guide meets the specification.

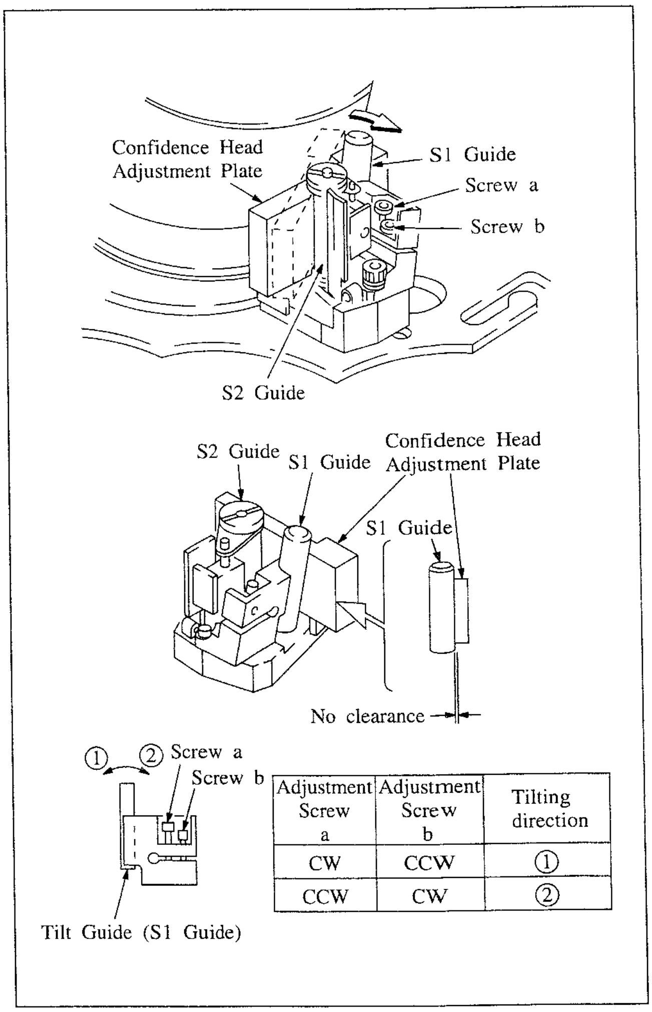
Specification : There must be no clearance between the Confidence Head Adjustment Plate and the S1 Guide.

If the clearance satisfies the specification, perform step 12 and the subsequent steps. If not, perform step (2) and the subsequent steps.

Adjustment

(2) To tilt the S1 Guide toward direction ①
(When there is clearance between the Confidence Head Adjustment Plate and the upper S1 Guide)
- Loosen screw b, then tighten screw a.
- After adjusting, tighten screw b.
- Hexagonal Driver: across 1.5 mm
  Tightening torque: 29.4×10^{-2} N·m (3 kgf·cm)

(3) To tilt the S1 guide toward direction ②
(When there is clearance between the Confidence Head Adjustment Plate and the lower S1 Guide)
- Loosen screw a, then tighten screw b.
- After adjusting, tighten screw a.
- Hexagonal Driver: across 1.5 mm
  Tightening torque: 29.4×10^{-2} N·m (3 kgf·cm)


Confidence Head
Adjustment Plate
S1 Guide
Screw a
Screw b
S2 Guide
S2 Guide
S1 Guide
Confidence Head
Adjustment Plate
S1 Guide
No clearance
①
②
Screw a
Screw b
Tilt Guide (S1 Guide)

Adjustment Screw a	Adjustment Screw b	Tilting direction
CW	CCW	①
CCW	CW	②

Fig. 6-15-14 S1 Guide Slantness Check/Adjustment (2)

12. T1 Guide slantness check/adjustment

Preparation

- Turn the Worm Gear of the Loading Motor shown in Fig. 6-15-15 in the direction of arrow B, and securely set it to the unthreading-end.

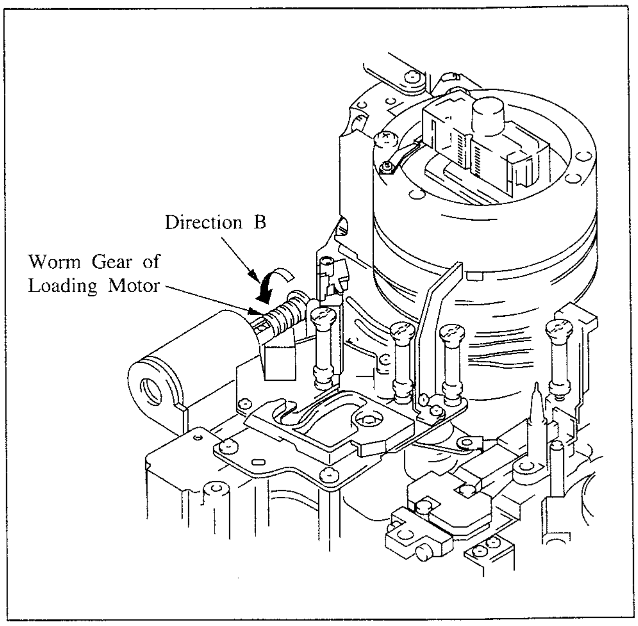

Direction B
Worm Gear of Loading Motor

Fig. 6-15-15 T1 Guide Slantness Check/Adjustment (1)

Check (Fig. 6-15-16)

(1) Set the Confidence Head Adjustment Plate as shown in the figure. At this time, check that the tilt of the T1 Guide from the T2 Guide meets the specification.

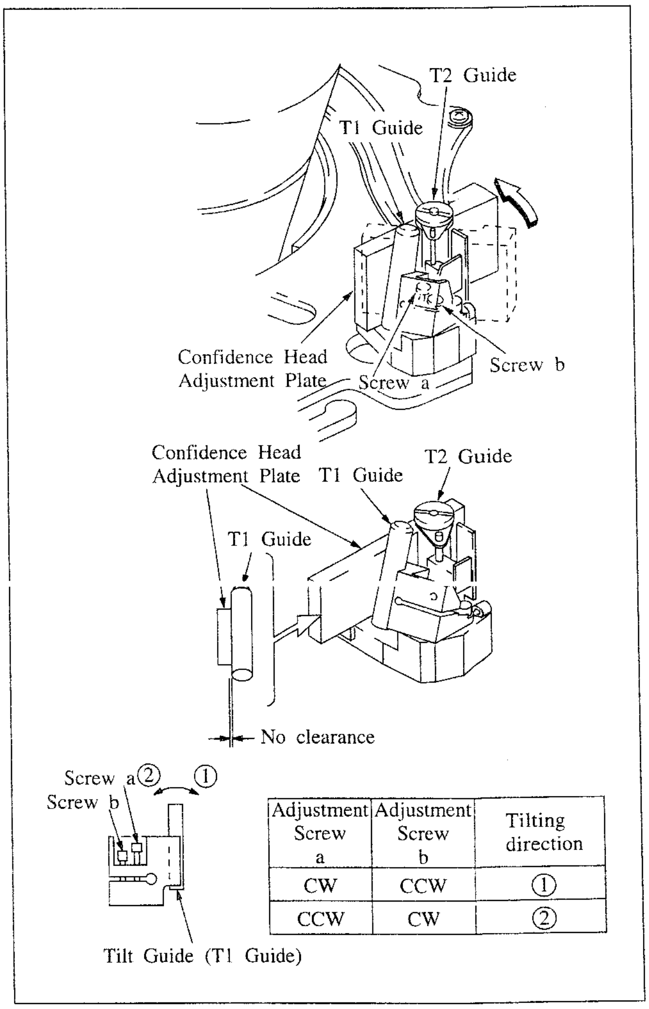
Specification : There must be no clearance between the Confidence Head Adjustment Plate and the T1 Guide.

If the clearance satisfies the specification, perform step 13 and the subsequent steps. If not, perform step (2) and the subsequent steps.

Adjustment

(2) To tilt the T1 Guide toward direction ①
(When there is clearance between the Confidence Head Adjustment Plate and the lower T1 Guide)
- Loosen screw b, then tighten screw a.
- After adjusting, tighten screw b.
- Hexagonal Driver: across 1.5 mm
- Tightening torque: 29.4×10^{-2} N·m (3 kgf·cm)

(3) To tilt the T1 Guide toward direction ②
(When there is clearance between the Confidence Head Adjustment Plate and the lower T1 Guide)
- Loosen screw a, then tighten screw b.
- After adjusting, tighten screw a.
- Hexagonal Driver: across 1.5 mm
- Tightening torque: 29.4×10^{-2} N·m (3 kgf·cm)


T2 Guide
T1 Guide
Confidence Head Adjustment Plate
Screw a
Screw b
Confidence Head Adjustment Plate
T1 Guide
T2 Guide
T1 Guide
No clearance
Screw a②
①
Screw b
Tilt Guide (T1 Guide)

Adjustment Screw a	Adjustment Screw b	Tilting direction
CW	CCW	①
CCW	CW	②

Fig. 6-15-16 T1 Guide Slantness Check/Adjustment (2)

13. Check/adjustment of clearance between S1 Guide and Drum

Preparation

- Turn the Worm Gear of the Loading Motor shown in Fig. 6-15-17 in the direction of arrow A, and securely set it to the threading-end.

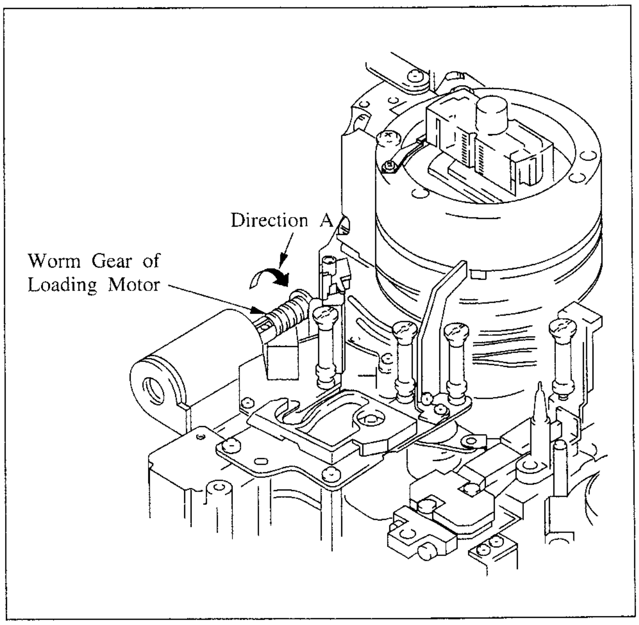


Fig. 6-15-17 Check of clearance between S1 Guide and Drum (1)

Check (Fig. 6-15-18)

(1) Confirm that clearance F between the S1 Guide and the Drum satisfies Specification 1 by using the thickness gauge.

Note 1 : Clean the thickness gauge with a cloth moistened with cleaning liquid before using it.

Note 2: When using the thickness gauge, rotate the inner drum by hand so that the gauge does not touch the rotary head. If the thickness gauge touches the rotary head, the rotary head may be damaged.

Specification 1 : Thickness gauge (t: 0.45 mm) goes through.
Thickness gauge (t: 0.6 mm) does not go through.

(2) Tilt the S1 Guide shown in the figure in the direction of arrow G. At this time, confirm that the minimum clearance H satisfies Specification 2.

Specification 2 : Clearance H ≧ 0.1 mm

When Specifications 1 and 2 are satisfied, perform step 14. If not, perform steps (3) and on.

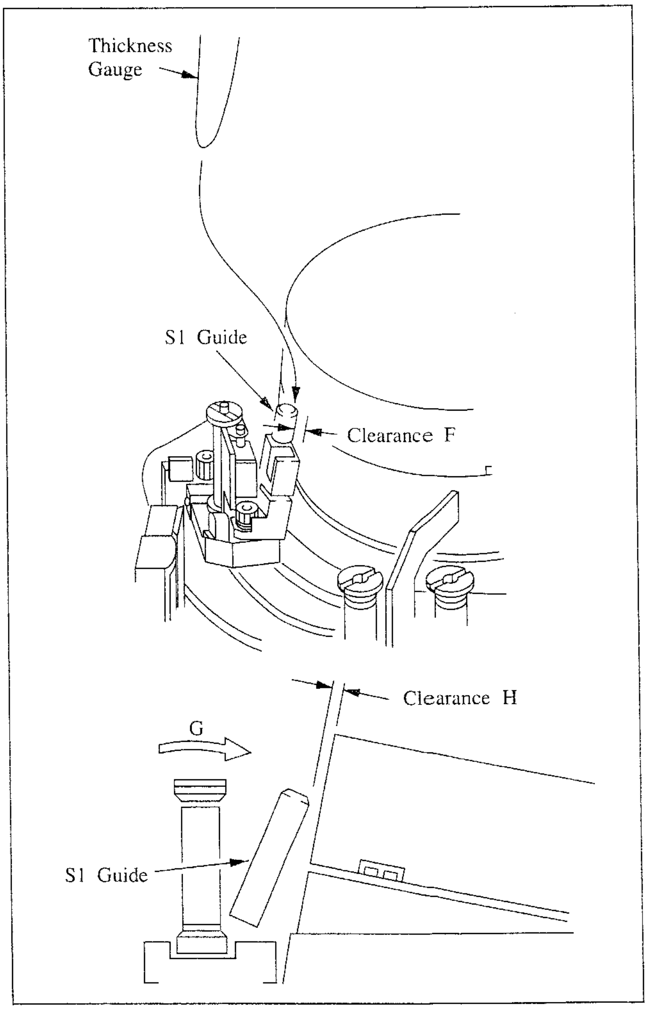


Fig. 6-15-18 Check of Clearance between S1 Guide and Drum (2)

Adjustment (Fig. 6-15-19)

(3) Loosen the fixing screw of the Slider (S) Ass'y shown in the figure by one or two rotations.

(4) Turn the adjusting screw and make adjustments so that the clearance satisfies Specifications 1 and 2 of steps (1) and (2) by moving the S1 Holder in the direction of arrow J.

When the clearance is wider than the specification:
Loosen the adjusting screw and push the S1 Holder in the direction of arrow a.
After that, tighten the adjusting screw and make adjustments by moving the S1 Holder in the direction of arrow b.

When the clearance is narrower than the specification:
Tighten the adjusting screw and make adjustments by moving the S1 Holder in the direction of arrow b.
Use a hexagonal wrench (across flats of 1.27 mm).

(5) Tighten the fixing screw, then double-check that specifications 1 and 2 of steps (1) and (2) are satisfied. If the specifications are not satisfied, repeat from step (3).
Use a hexagonal wrench (across flats of 2 mm)
Tightened torque: 58.8×10^{-2} N·m (6 kgf·cm)

(6) If the specifications are satisfied, apply a small amount of Locking compound (Screw lock) over the heads of the fixing screw and adjusting screw.

14. Check/adjustment of clearance between T1 Guide and Dram

Preparation

- Turn the Worm Gear of the Loading Motor shown in Fig. 6-15-20 in the direction of arrow B, and securely set it to the threading-end.

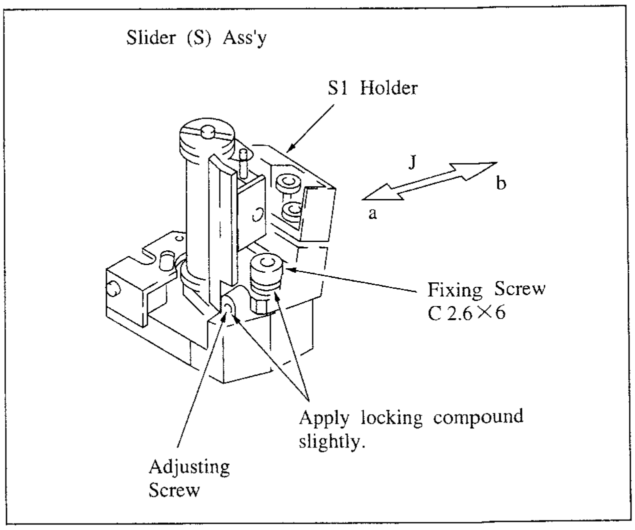


Fig. 6-15-19 Adjustment of Clearance between S1 Guide and Drum

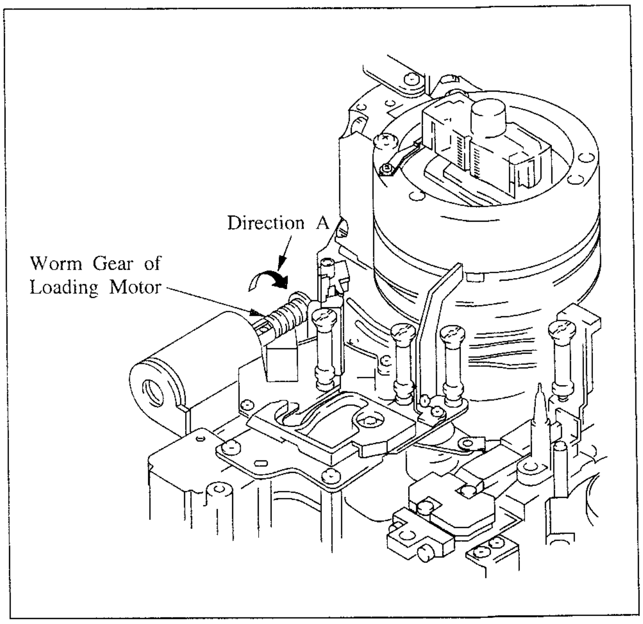


Fig. 6-15-20 Check of Clearance between T1 Guide and Drum (1)

Check (Fig. 6-15-21)

(1) Confirm that clearance K between the T1 Guide and the Drum shown in the figure satisfies the specification.
Use the thickness gauge and the Confidence Head Adjustment Plate to measure the clearance.

Note 1 : Clean the thickness gauge and the Confidence Head Adjustment Plate with a cloth moistened with cleaning liquid before using them.

Note 2 : When using the thickness gauge, rotate the rotary head by hand so that the gauge does not touch the rotary head. If the thickness gauge touches the rotary head, the rotary head may be damaged.

Specification : Clearance K:
4.1 mm (Confidence Head Adjustment Plate (t: 3.0 mm) + thickness gauge (t: 0.5 mm + t: 0.6 mm)) goes through.

4.3 mm (Confidence Head Adjustment Plate (t: 3.0 mm) + thickness gauge (t: 1.0 mm and t: 0.3 mm)) does not go through.

When the specification is satisfied, perform step 13. If not, perform step (2) and on.

Adjustment (Fig. 6-15-22)

(2) Loosen the fixing screw of the Slider (T) Ass'y shown in the figure by one or two rotations.

(3) Turn the adjusting screw and make adjustments so that the clearance satisfies the specification in step (1) by moving the T1 Holder in the direction of arrow L.

When the clearance is wider than the specification:
Loosen the adjusting screw and push the T1 Holder in the direction of arrow a.
After that, tighten the adjusting screw and make adjustments by moving the T1 Holder in the direction of arrow b.
Use a hexagonal wrench (across flats of 1.27 mm).

When the clearance is narrower than the specification:
Tighten the adjusting screw and make adjustments by moving the S1 Holder in the direction of arrow b.

(4) Tighten the fixing screw, then double-check that the specification in step (1) is satisfied.
If not, repeat from step (2).
- Hexagonal Driver: across 2 mm
  Tightening torque: 58.8×10^{-2} N·m (6 kgf·cm)

(5) If the specification is satisfied, apply a small amount of Locking compound (Screw lock) over the heads of the fixing screw and adjusting screw.

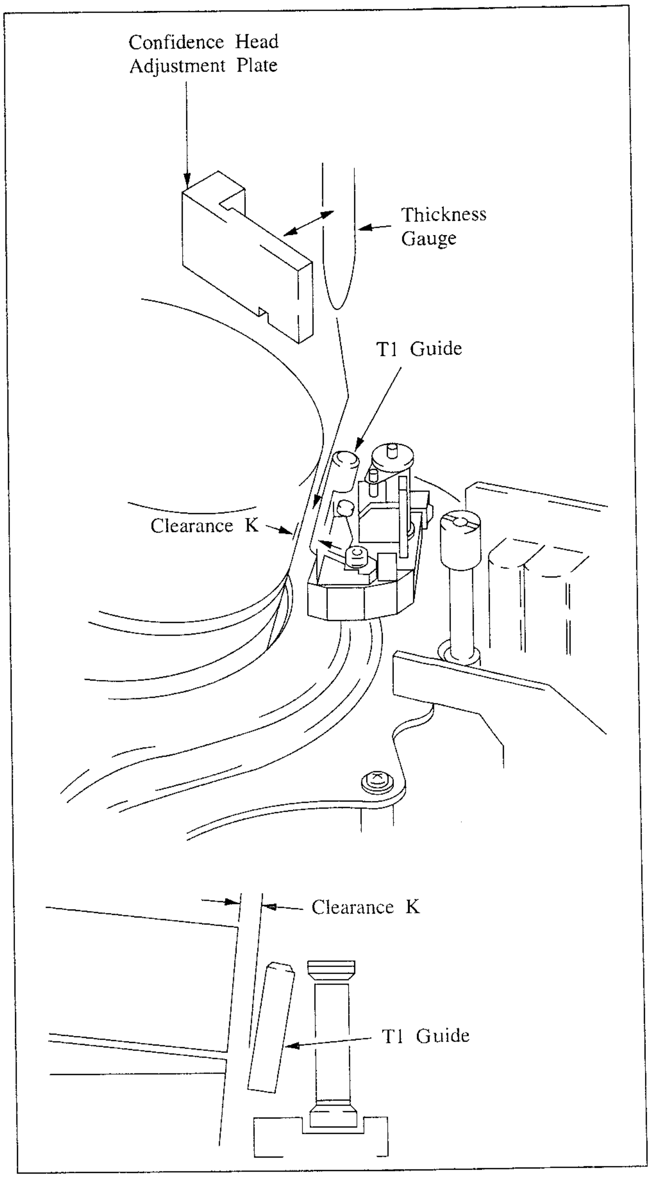


Fig. 6-15-21 Check of Clearance between T1 Guide and Drum (2)

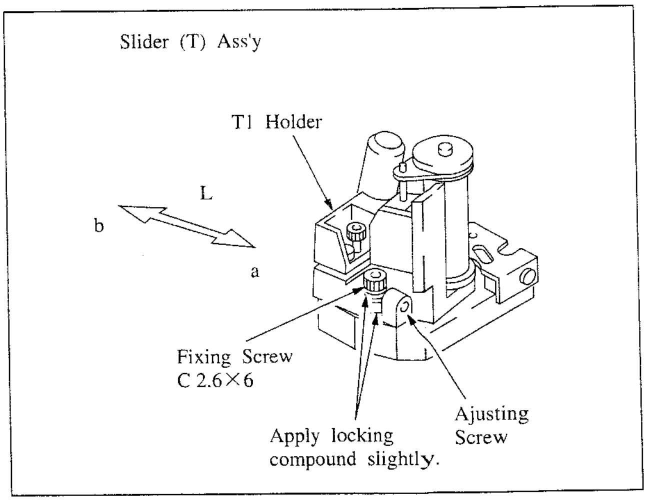


Fig. 6-15-22 Adjustment of Clearance between T1 Guide and Drum

15. S1 Guide slantness check/adjustment
    Perform the check in step 11 to check that the specification is satisfied.
    If not, repeat from step 11.

16. T1 Guide slantness check/adjustment
    Perform the check in step 12 to check that the specification is satisfied.
    If not, repeat from step 12.

17. Cassette Compartment Ass'y installation
    Refer to Section 6-5.

18. Tape transport adjustment
    Refer to Section 9.

6-16. LOADING MOTOR ASS'Y REPLACEMENT

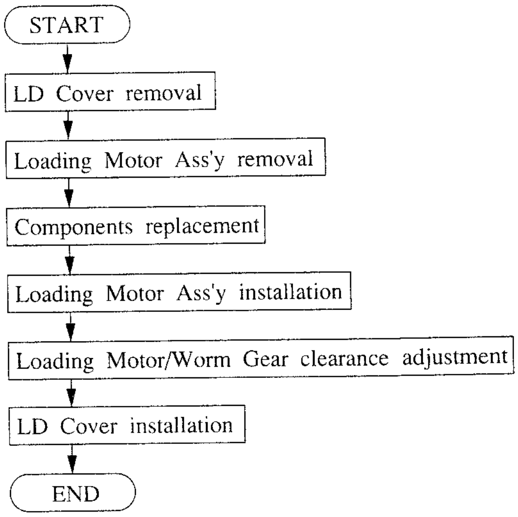
Basic Knowledge

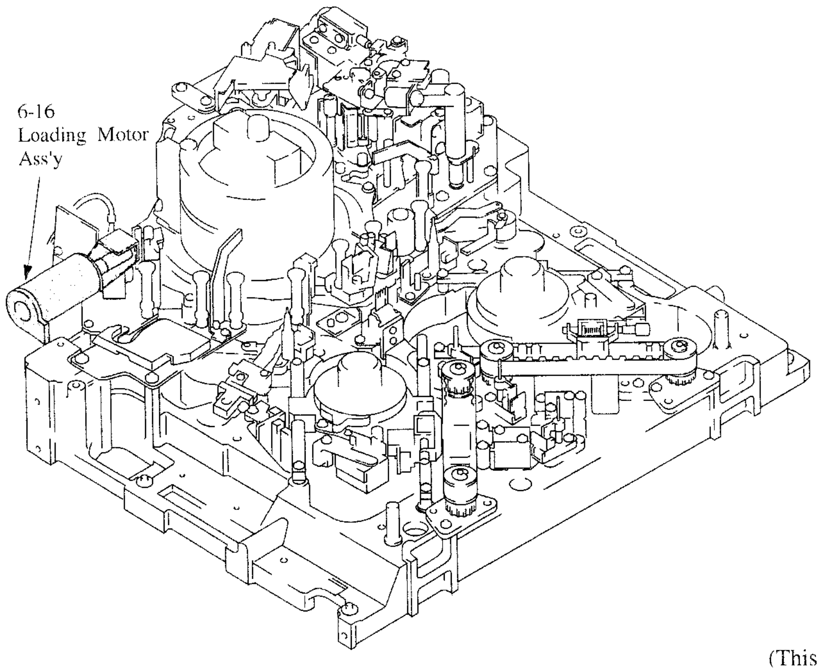
A. The Loading Motor Ass'y is shown in Fig. 6-16-1.

B. Prepare the following tools.

- Wire gauge set
  Sony Parts No. : J-6152-450-A
- Molyton grease
  Sony Parts No. : 7-662-001-41

C. Replacement flowchart


START
LD Cover removal
Loading Motor Ass'y removal
Components replacement
Loading Motor Ass'y installation
Loading Motor/Worm Gear clearance adjustment
LD Cover installation
END


6-16
Loading Motor
Ass'y

(This illustration is DVR-28)

Fig. 6-16-1 **Loading Motor Ass'y**

Removal

1. LD Cover removal (Fig. 6-16-2)
   - Remove the screw securing the LD Cover shown in the figure and then remove the LD Cover in the direction of the arrow.

2. Loading Motor Ass'y removal (Fig. 6-16-2)
   (1) Remove connector CN312 of the MT-47 Board shown in the figure.
   (2) Remove the screw fixing the Loading Motor Ass'y and then remove the Loading Motor Ass'y by moving it upward.

3. Components replacement (Fig. 6-16-3)
   (1) Remove the two screws fixing the Loading Motor and the two setscrews shown in the figure and divide the Loading Motor Ass'y into the motor section and the worm gear section.
   (2) Replace the necessary components.

   Note : When assembling, smear a small amount of Molyton grease to the portion of the Worm Joint specified in Fig. 1.

   (3) After completion of assembly, rotate the Worm Gear by hand and confirm that it rotates smoothly.

4. Loading Motor Ass'y installation
   Install the Loading Motor Ass'y in the reverse order of step 2.

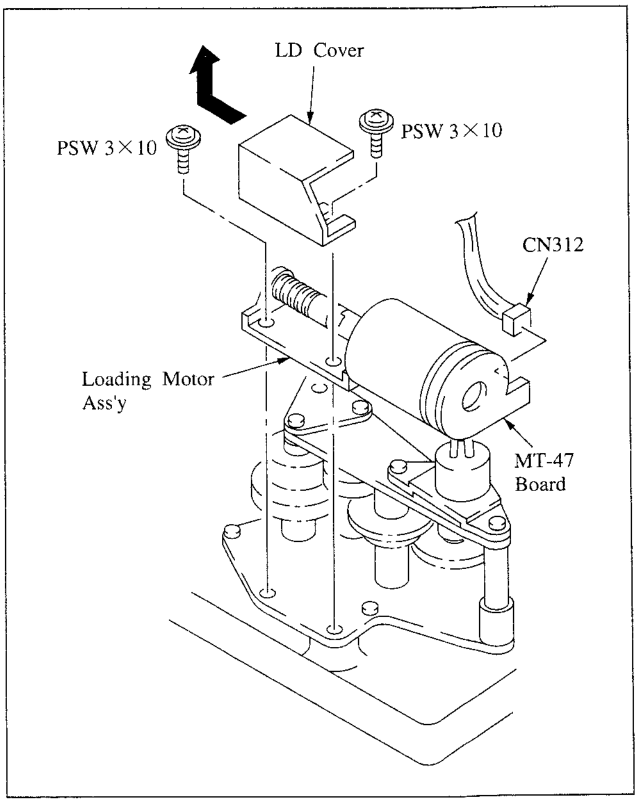

LD Cover
PSW 3×10
PSW 3×10
CN312
Loading Motor Ass'y
MT-47 Board

Fig. 6-16-2 Loading Motor Ass'y Removal

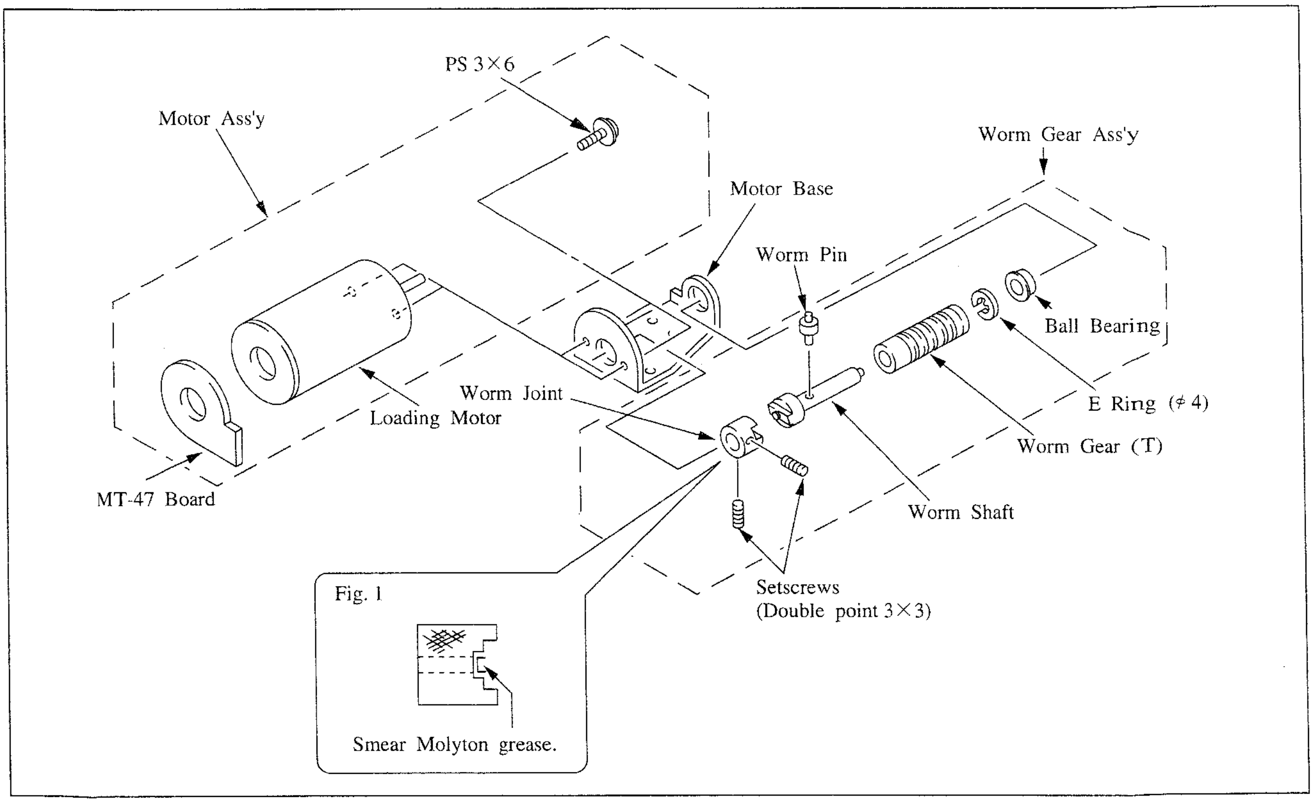

PS 3×6
Motor Ass'y
Worm Gear Ass'y
Motor Base
Worm Pin
Ball Bearing
E Ring (ϕ 4)
Worm Joint
Loading Motor
Worm Gear (T)
MT-47 Board
Worm Shaft
Setscrews
(Double point 3×3)
Fig. 1
Smear Molyton grease.

Fig. 6-16-3 Loading Motor Ass'y Components Replacement

Adjustment

5. Loading Motor/Worm Gear clearance adjustment

Basic knowledge

- Screw ⓑ shown in Fig. 6-16-4 is tightened temporarily. Screw ⓐ with which the LD Cover is fixed is tightened temporarily. After completion of adjustment (refer to step 1), remove screw ⓐ.

Adjustment

(1) Insert a 0.4 mm wire gauge in the engagement section of the Worm Gear and the M3 Gear shown in Fig. 6-16-4 until it reaches the Motor Base.

Note : Insert the wire gauge into the place where the bottom of the Worm Gear tooth is closest to the top of the M3 Gear tooth.

(2) Tighten screw ⓑ while slightly pushing the Loading Motor Ass'y in the direction of arrow A.

(3) Remove the wire gauge and insert the following wire gauges into the same place. Confirm that the specification is satisfied.

Specification : A 0.3 mm wire gauge goes through.
A 0.5 mm wire gauge does not go through.

If the specification is not satisfied, repeat the procedure starting from step (1).

(4) Rotate the joint section of the Loading Motor in the direction of arrow B. Confirm that the clearance of the gear at positions c, d, and e of the M3 Gear satisfies the specification.

Specification : A 0.3 mm wire gauge goes through.
A 0.5 mm wire gauge does not go through.

If the specification is not satisfied, repeat the procedure from step (1).

(5) Loosen the two setscrews shown in Fig. 6-16-5 once and then tighten the two setscrews alternately while slightly pushing the Worm Joint in the direction of arrow C.

(6) Rotate the Worm Gear by hand and confirm that it rotates smoothly.

(7) Smear a small amount of Molyton grease to the portion of the Worm Gear specified in the Fig. 6-16-4.

6. LD Cover installation (Fig. 6-16-6)

(1) Match the hole of the LD Cover and the peripheral surface of the bearing.

(2) Fix the LD Cover with screw ⓐ while moving the cover in the direction of arrow D.

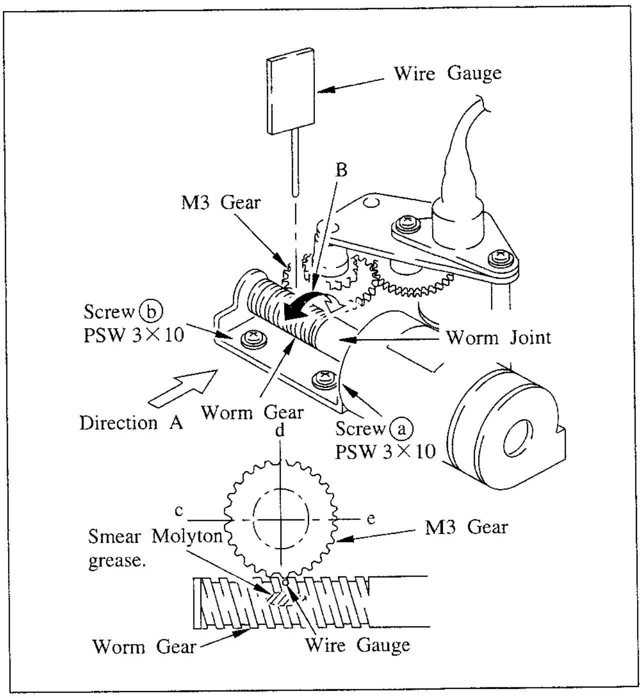

Wire Gauge
B
M3 Gear
Screw ⓑ
PSW 3×10
Worm Joint
Direction A
Worm Gear
d
Screw ⓐ
PSW 3×10
c
e
Smear Molyton grease.
M3 Gear
Worm Gear
Wire Gauge

Fig. 6-16-4 Loading Motor Worm Gear Clearance Adjustment (1)

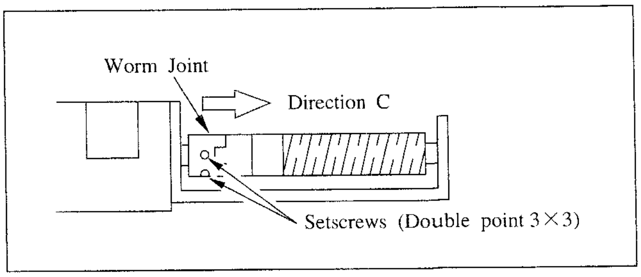

Worm Joint
Direction C
Setscrews (Double point 3×3)

Fig. 6-16-5 Loading Motor Worm Gear Clearance Adjustment (2)

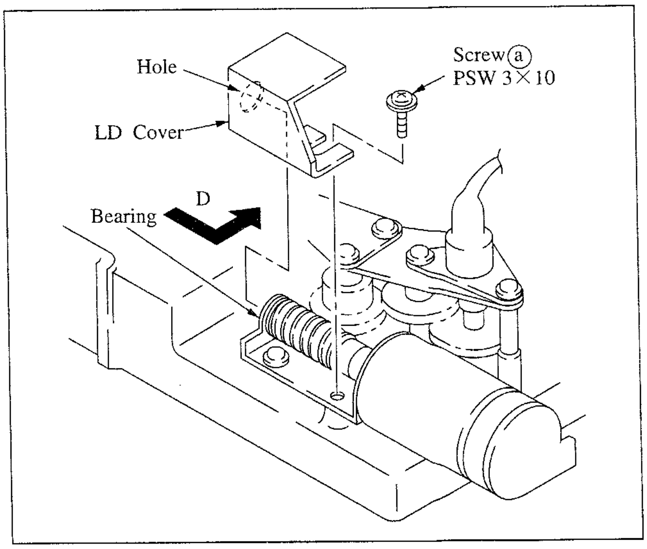

Hole
Screw ⓐ
PSW 3×10
LD Cover
D
Bearing

Fig. 6-16-6 LD Cover Installation

6-17. M GEAR BOX ASS'Y REPLACEMENT

Basic Knowledge

A. Fig. 6-17-1 shows the M Gear Box Ass'y block.
To replace components, the Drum Ass'y must be removed together with the Drum Base. In this section, procedures to replace the Drum Ass'y together with the Drum Base are described in Section 6-17-1, "Drum Base Block Removal/Installation", followed by the sections below.

6-17-2. M Gear Box Ass'y Replacement
6-17-3. Potentiometer Position Adjustment

B. Prepare the following tools.
- RG Set Pin
  Sony Parts No.: J-6254-650-A
- Wire Gauge Set
  Sony Parts No.: J-6152-450-A
- Thickness Gauge
  Sony Parts No.: J-6041-670-A
- Cleaning liquid (or equivalent)
  Sony Parts No.: 9-919-573-00
- Molyton grease
  Sony Parts No.: 7-662-001-41

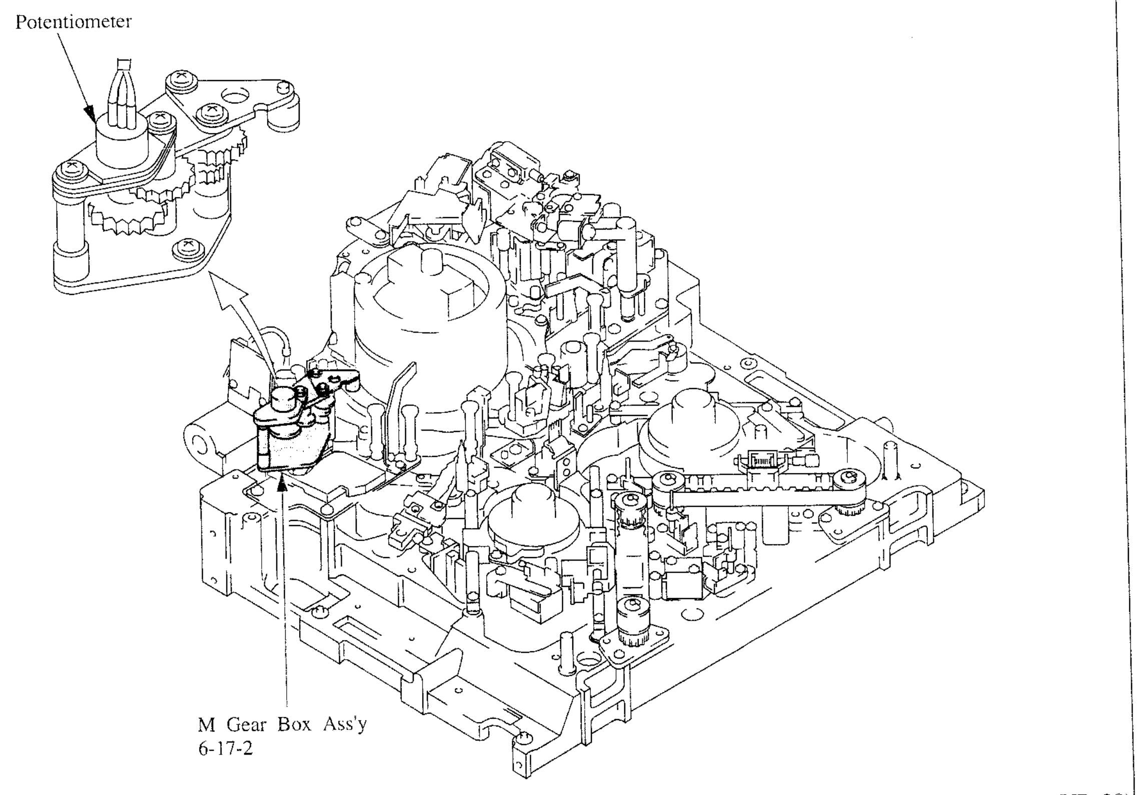


Fig. 6-17-1 M Gear Box Ass'y

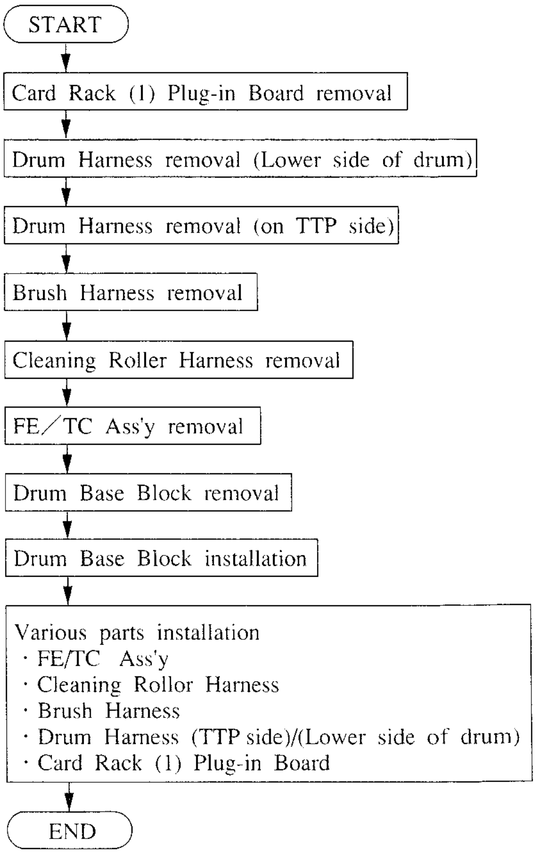
6-17-1. Drum Base Block Removal/Installation

Basic Knowledge

A. Drum Base Block removal is necessary to remove the following parts (blocks):

- M Gear Box Ass'y
- S Gear Box Ass'y
- Main Shaft Ass'y
- Loading Gear S/T Ass'y
- T Load Arm Ass'y

B. Replacement flowchart


START
Card Rack (1) Plug-in Board removal
Drum Harness removal (Lower side of drum)
Drum Harness removal (on TTP side)
Brush Harness removal
Cleaning Roller Harness removal
FE／TC Ass'y removal
Drum Base Block removal
Drum Base Block installation
Various parts installation
· FE/TC Ass'y
· Cleaning Rollor Harness
· Brush Harness
· Drum Harness (TTP side)/(Lower side of drum)
· Card Rack (1) Plug-in Board
END

Removal

1. Card Rack (1) Plug-In Board removal
   - Remove the Card Rack (1) Plug-In Board. Refer to Section 6-2.

2. Drum Harness removal (Lower side of drum)
   (1) Lay the machine on its side so that the power block is on the bottom.

   Note : Be careful not to cause impact or shock the machine.

   (2) Remove the four screws fixing the Bottom Cover, then remove the Bottom Cover.

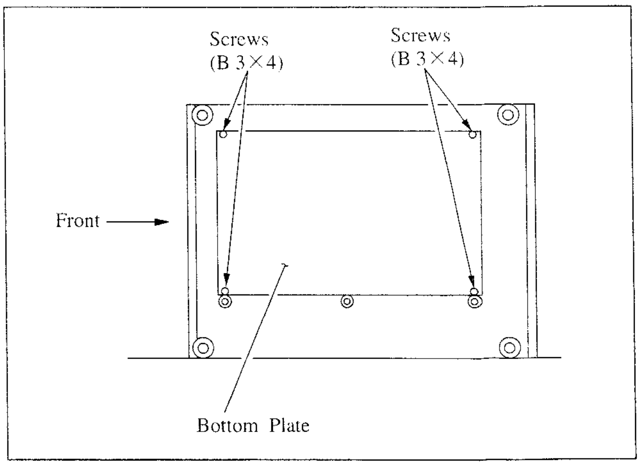

Screws
(B 3×4)
Screws
(B 3×4)
Front
Bottom Plate

Fig. 6-17-2 Bottom Cover Removal

(3) Remove connectors CN321, CN322, and CN323 that are connected to the Drum.

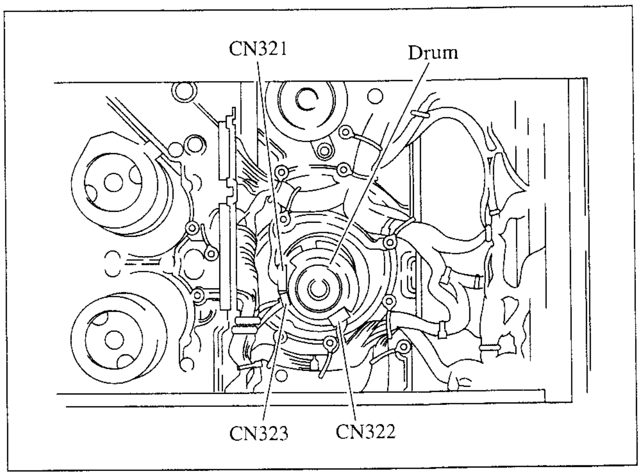

CN321
Drum
CN323
CN322

Fig. 6-17-3 Drum Harness Removal

(4) Remove the three screws fixing the Drum Base.
(5) Return the machine to the horizontal position.

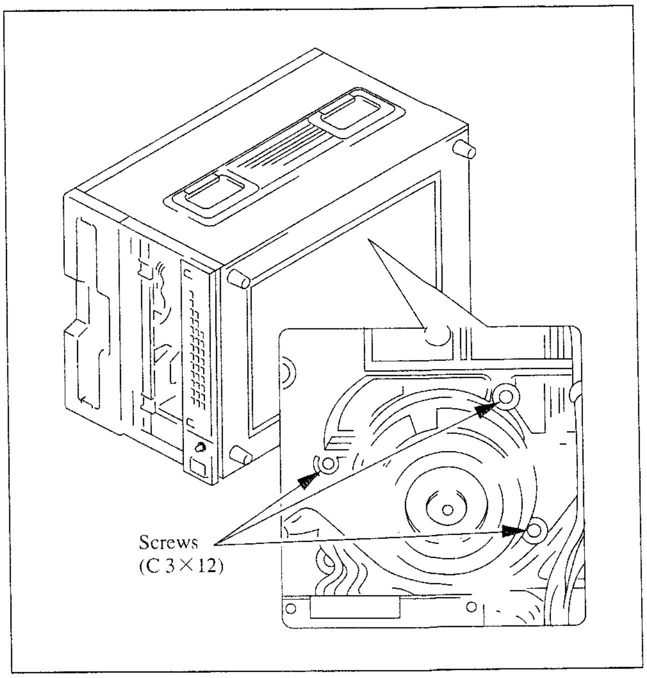

Screws
(C 3×12)

Fig. 6-17-4 Drum Base Fixing Screws Removal

3. Drum Harness removal (on TTP side)
   (1) Remove the Drum Harness connectors from each board.
   (2) Remove the Drum Harnesses from the Harness Clamps.

   Note: The DVR-P28 does not have the REC-11Board, connectors CN451 to CN454 and CN481 to CN484.

4. Brush Harness removal
   (1) Remove the two screws that lock the Board Cover, then remove the Board Cover.
   (2) Remove the Brush Harness connector CN333 from the CN-171 Board.
   (3) Disconnect the connector CN333 of the dew condensation.

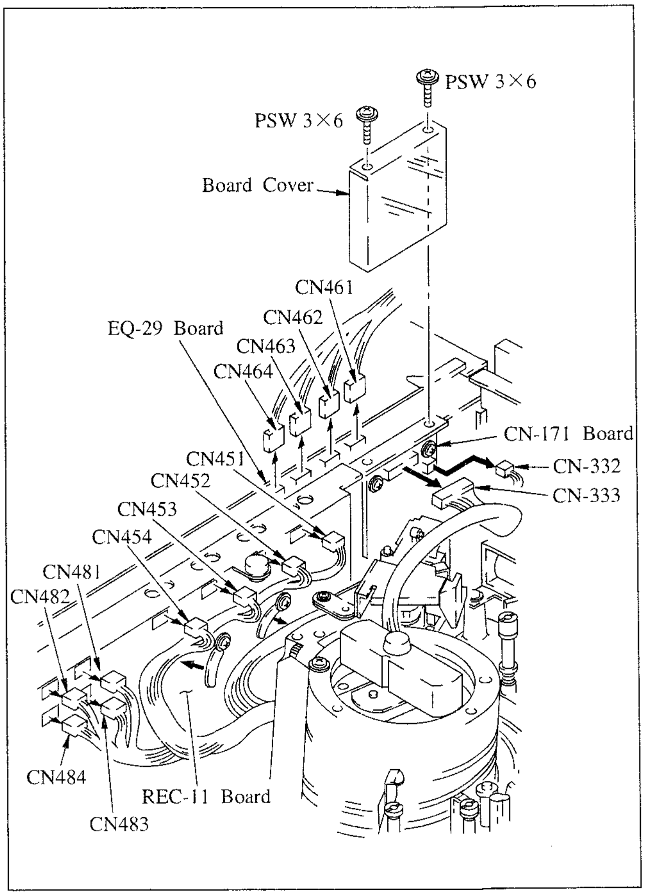

PSW 3×6
PSW 3×6
Board Cover
CN461
CN462
EQ-29 Board
CN463
CN464
CN-171 Board
CN-332
CN-333
CN451
CN452
CN453
CN454
CN481
CN482
CN484
REC-11 Board
CN483

Fig. 6-17-5 Drum Harness (TTP Side)/Brush Harness Removal

5. Cleaning Roller Harness removal
   - Disconnect the connector from the CN-309 Board which is attached to the Cleaning Roller Ass'y.

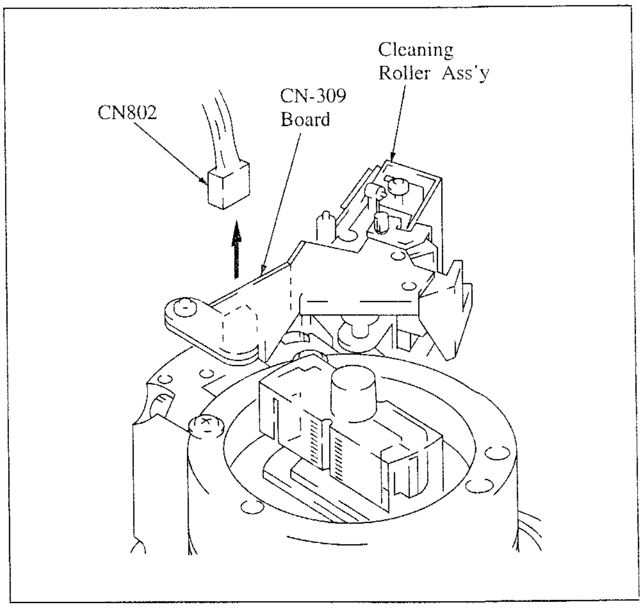

Cleaning Roller Ass'y
CN-309 Board
CN802

Fig. 6-17-6 Cleaning Roller Harness Removal

6. FE/TC Ass'y removal (Fig. 6-17-7)
   (1) Disconnect the two connectors shown in the figure.
   (2) Remove the screw which locks the FE/TC Ass'y and dismount the FE/TC Ass'y.
   (The DVR-P28 does not have the FE Head)
   Note: Do not touch the tape surface of the Tape Cleaner.

Applicable Serial Numbers

	Model		S/N
*4:	DVR-28 (UC)	S/N	12201 and higher
	DVR-28P (UC)	S/N	11201 and higher
	DVR-28P (EK)	S/N	11801 and higher

7. Drum Base Block removal (Fig. 6-17-8)
   (1) Remove the connectors (CN831, CN832) which fix the V Plate (S)/(T) Ass'y.
   (2) Remove the three screws (PSW 3x10) of the LD Rail shown in the figure and dismount the Drum Base Block.

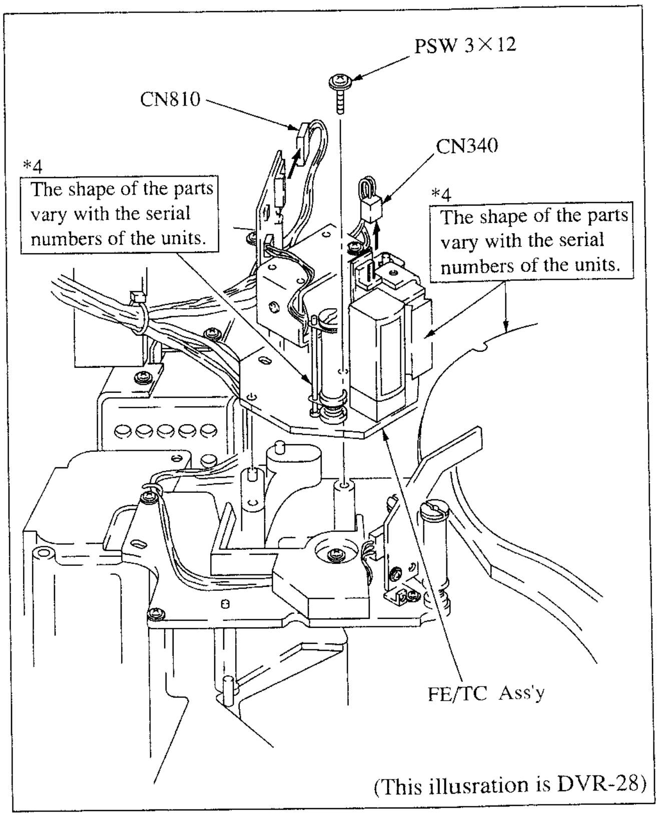

PSW 3×12
CN810
CN340
*4
The shape of the parts vary with the serial numbers of the units.
*4
The shape of the parts vary with the serial numbers of the units.
FE/TC Ass'y
(This illusration is DVR-28)

Fig. 6-17-7 FE/TC Ass'y Removal

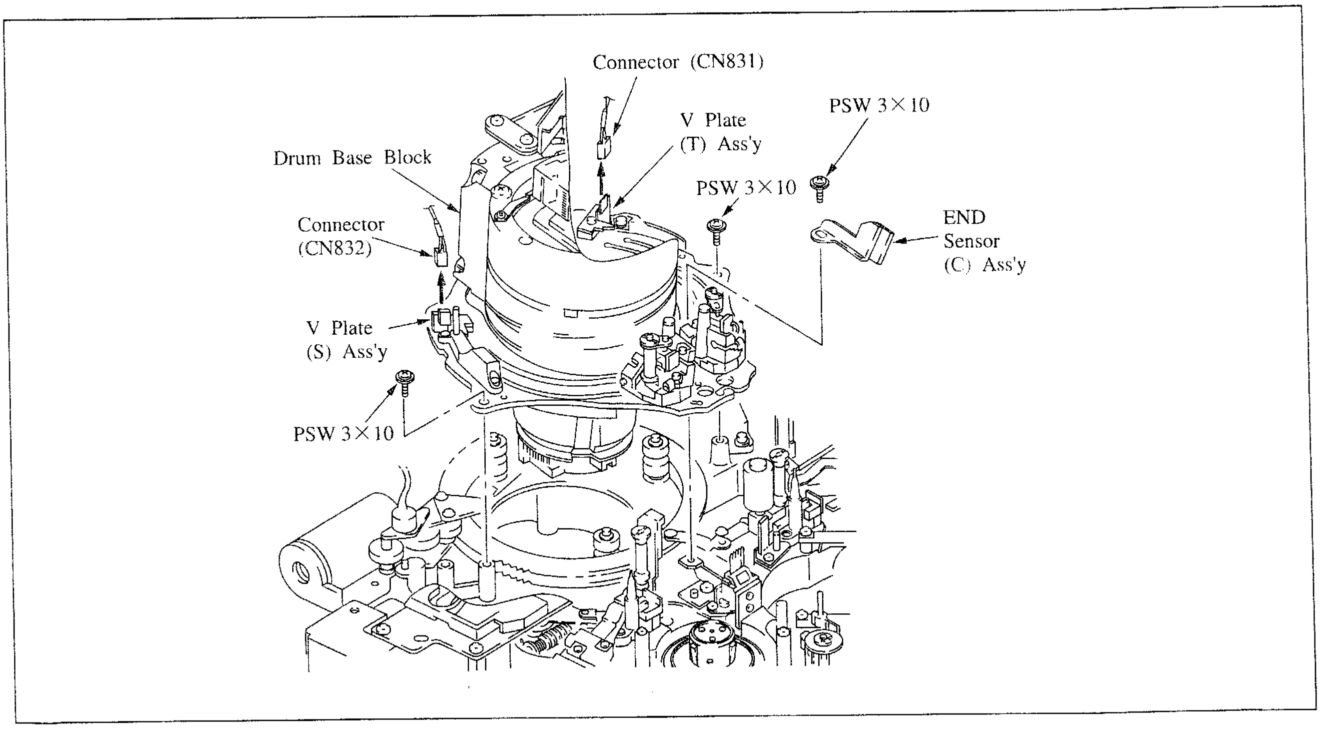

Connector (CN831)
V Plate
(T) Ass'y
PSW 3×10
Drum Base Block
PSW 3×10
Connector
(CN832)
END
Sensor
(C) Ass'y
V Plate
(S) Ass'y
PSW 3×10

Fig. 6-17-8 Drum Base Block Removal

Installation

8. Drum Base Block Installation
   1. (1) Clean the mount surfaces of the Drum Base Block and the Base Plate with a cleaning piece which is moistened with cleaning liquid.
   2. (2) Mount the Drum Base Block by reversing the step 7 procedure.

Note : Before locking it, pull out the (S)/(T) link of Loading Gear (S)/(T) Ass'y with hand in the direction shown in Fig. 6-17-9.
Smear a small amount of Molyton grease to the holes of the S and T links, and insert the Guide Shaft of the Slider (S)/(T) Ass'y to the holes of the S and T links.
Take care so as not to smear the grease to another portion.

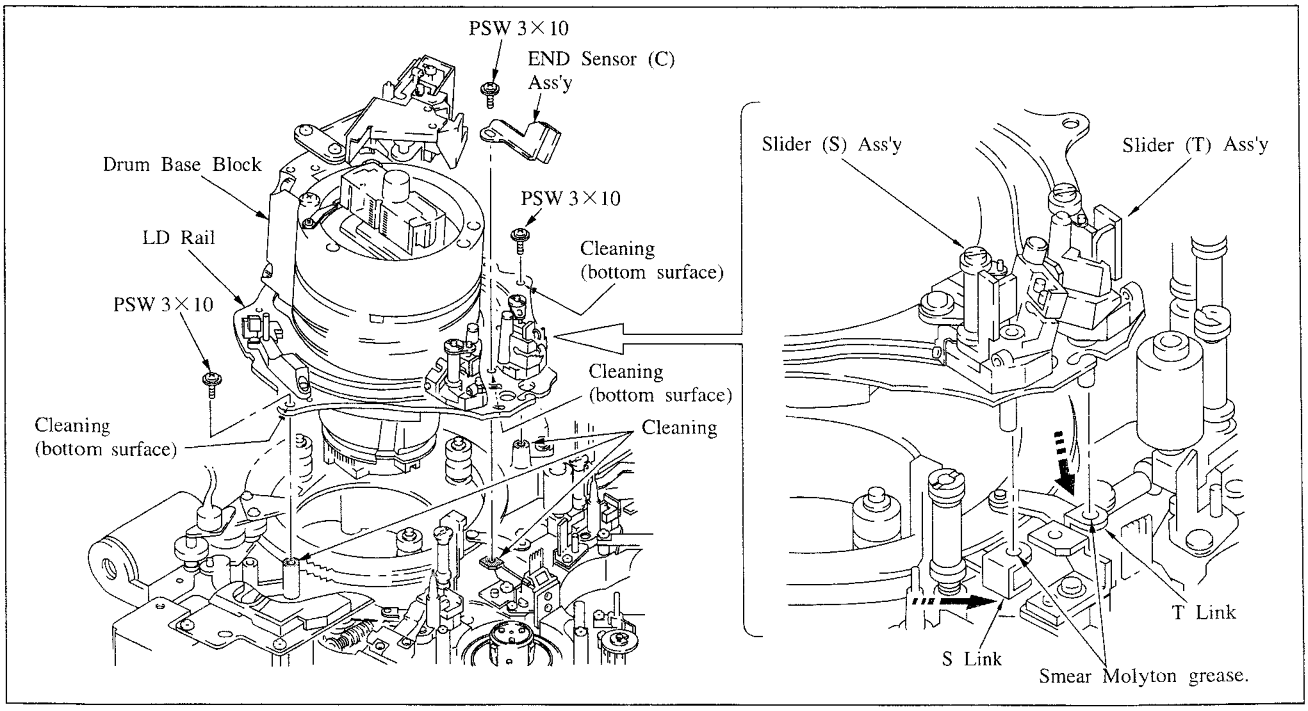

PSW 3×10
END Sensor (C) Ass'y
Drum Base Block
PSW 3×10
LD Rail
Cleaning (bottom surface)
PSW 3×10
Cleaning (bottom surface)
Cleaning
Cleaning (bottom surface)
Slider (S) Ass'y
Slider (T) Ass'y
T Link
S Link
Smear Molyton grease.

Fig. 6-17-9 Drum Base Block Installation

(3) Check if the Slider (S)/(T) Ass'y moves smoothly in the direction A and B by turning the Worm Gear of the Loading Motor.

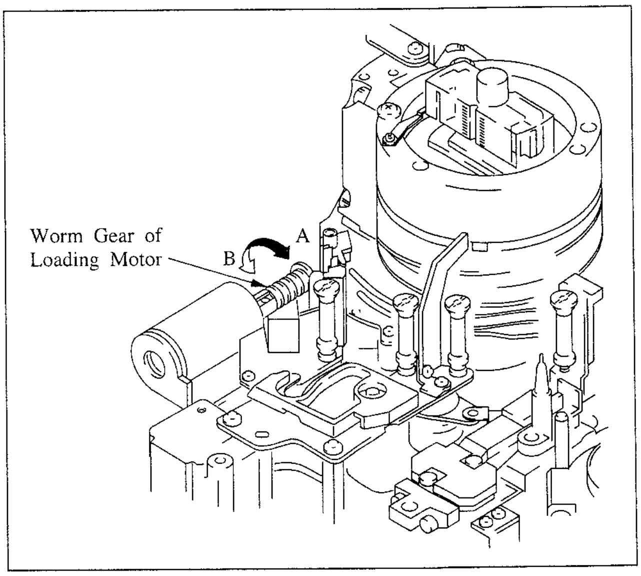


Fig. 6-17-10 Worm Gear of Loading Motor

9. Various parts installation
   - FE/TC Ass'y
   - Cleaning Roller Harness
   - Brush Harness
   - Drum Harness (TTP side)/(Lower side of drum)
   - Card Rack (1) Plug-in Board

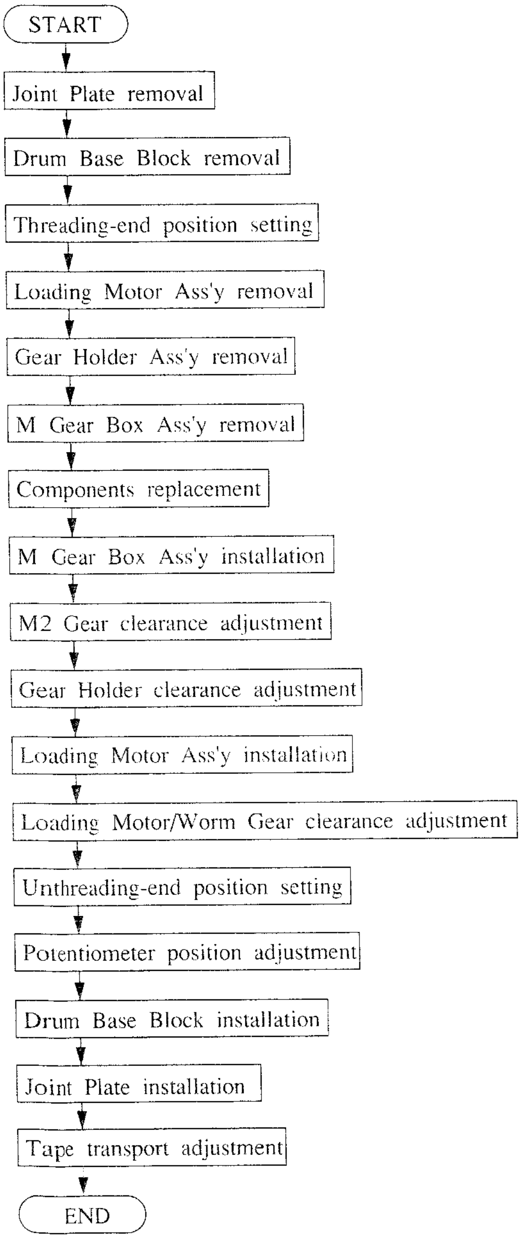
   Mount the above parts by reversing the procedure of steps 1 through 6.

6-17-2. M Gear Box Ass'y Replacement

Basic Knowledge

A. Dismount the following parts before replacing the M Gear Box Ass'y.
- Joint Board of Cassette Compartment
- Drum Base Block
- Loading Motor Ass'y
- Gear Holder Ass'y

B. Replacement flowchart


START
Joint Plate removal
Drum Base Block removal
Threading-end position setting
Loading Motor Ass'y removal
Gear Holder Ass'y removal
M Gear Box Ass'y removal
Components replacement
M Gear Box Ass'y installation
M2 Gear clearance adjustment
Gear Holder clearance adjustment
Loading Motor Ass'y installation
Loading Motor/Worm Gear clearance adjustment
Unthreading-end position setting
Potentiometer position adjustment
Drum Base Block installation
Joint Plate installation
Tape transport adjustment
END

Removal

1. Joint Plate removal (Fig. 6-17-11)
   (1) Remove two screws fixing the Joint Plate, then remove the plate.
   (2) Push the Lever shown in the figure, then lift the USE Ass'y in the direction of the arrow.

2. Drum Base Block removal
   Refer to Section 6-17-1.

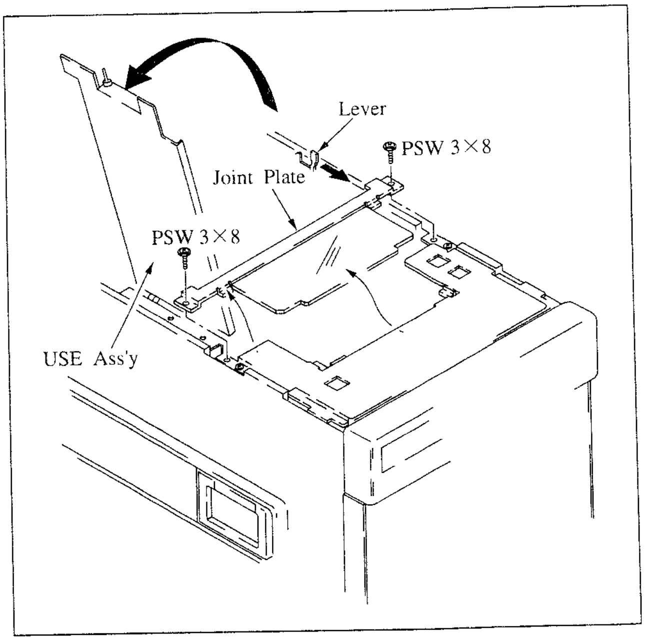


Fig. 6-17-11 **Joint Plate Removal**

3. Threading-end position setting (Fig. 6-17-12)
   (1) By hand, turn the Worm Gear of the Loading Motor shown in the figure in the direction indicated by arrow A, then set the S/T Arm Ass'y to the threading-end.
   At this time, confirm that the longitudinal holes of the Loading Gears (S) and (T) shown in the figure are aligned with the round holes of the Base Plate when they are viewed from above.
   (2) Insert the RG Set Pin to the hole, then fix the Loading Gear.

4. Loading Motor Ass'y removal
   Refer to Section 6-16.

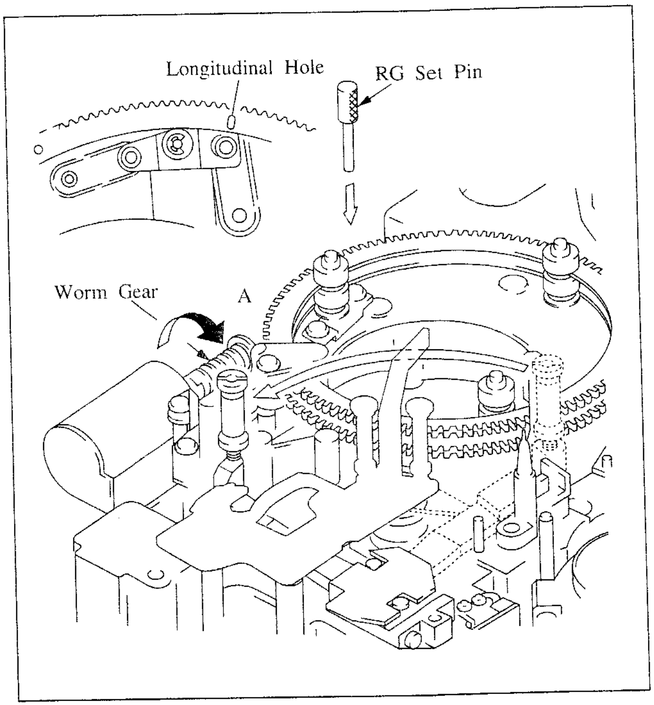


Fig. 6-17-12 **Threading-end Position Setting**

5. Gear Holder Ass'y removal (Fig. 6-17-13)
   - Remove the two screws that lock the Gear Holder Ass'y, then remove the Gear Holder Ass'y.

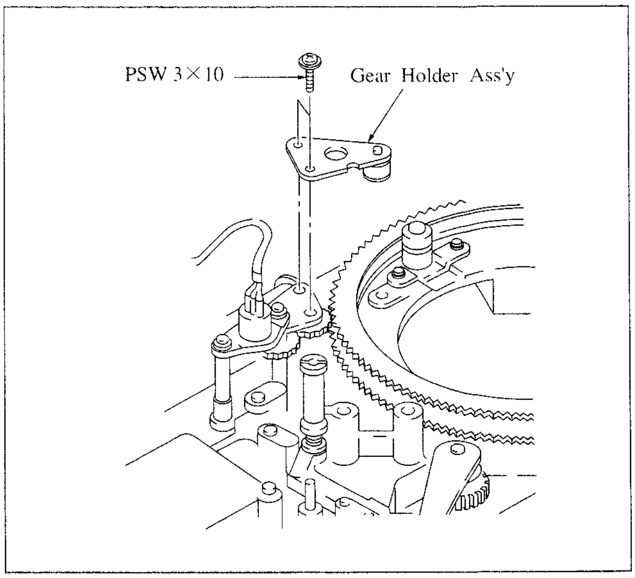

PSW 3×10
Gear Holder Ass'y

Fig. 6-17-13 Gear Holder Ass'y Removal

6. M Gear Box Ass'y removal (Fig. 6-17-14)
   (1) Remove connector CN373 of the harness (CN373) from the SE-123 Board.
   (2) Remove the two screws that lock the M Gear Box Ass'y, then remove the M Gear Box Ass'y.

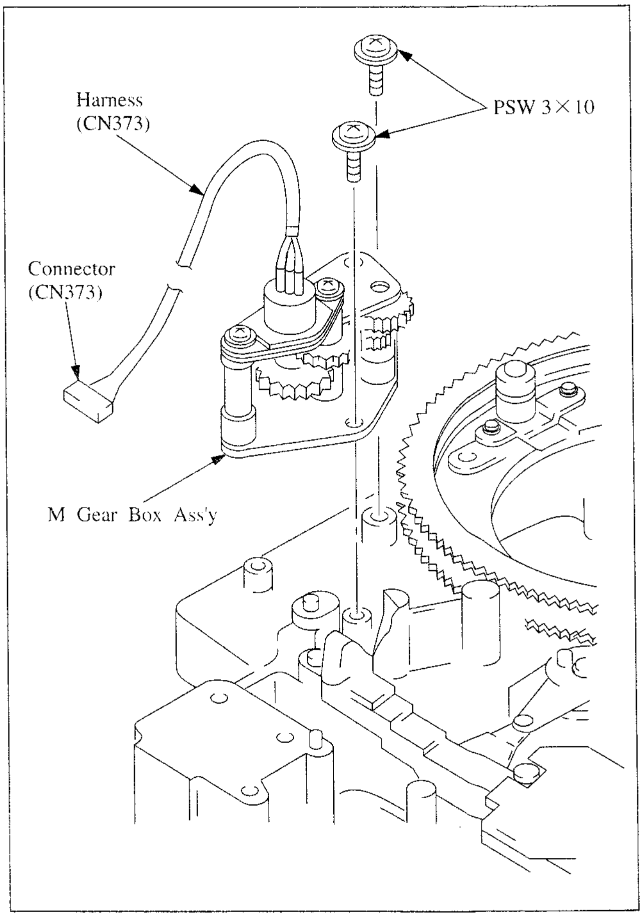

Harness
(CN373)
PSW 3×10
Connector
(CN373)
M Gear Box Ass'y

Fig. 6-17-14 M Gear Box Ass'y Removal

Replacement

7. Components replacement
   (1) Remove the two screws that lock the PM Adjusting Plate to remove the Potentiometer portion so that the M Gear Box Ass'y is disassembled as shown in the figure.
   (2) Replace the necessary parts, and assemble them.

Note : When replacing and assembling the parts of the M Gear Box Ass'y, note the following:

1. Note the direction for installing the PM Holder (shown in Fig. 6-17-15) and the tightening torque of the nut and setscrew.
   Use a hexagonal wrench (across flats of 1.5 mm).
   Tightening torque
   Nut : 88.2×10^{-2} N·m (9kgf·cm)
   Setscrew : 39.2×10^{-2} N·m (4kgf·cm)
2. When replacing parts of the gear section, wipe the surface of the shaft shown in the figure with a cloth moistened with alcohol.
   After that, adequately smear Molyton grease to the gear section.
3. Turn the M3 gear by hand and confirm that it turns smoothly.

Installation

8. M Gear Box Ass'y installation
   (1) Mount the M Gear Box Ass'y to the Base Plate using two screws. (Refer to Fig. 6-17-14.)
   (2) Remove the RG Set Pin.

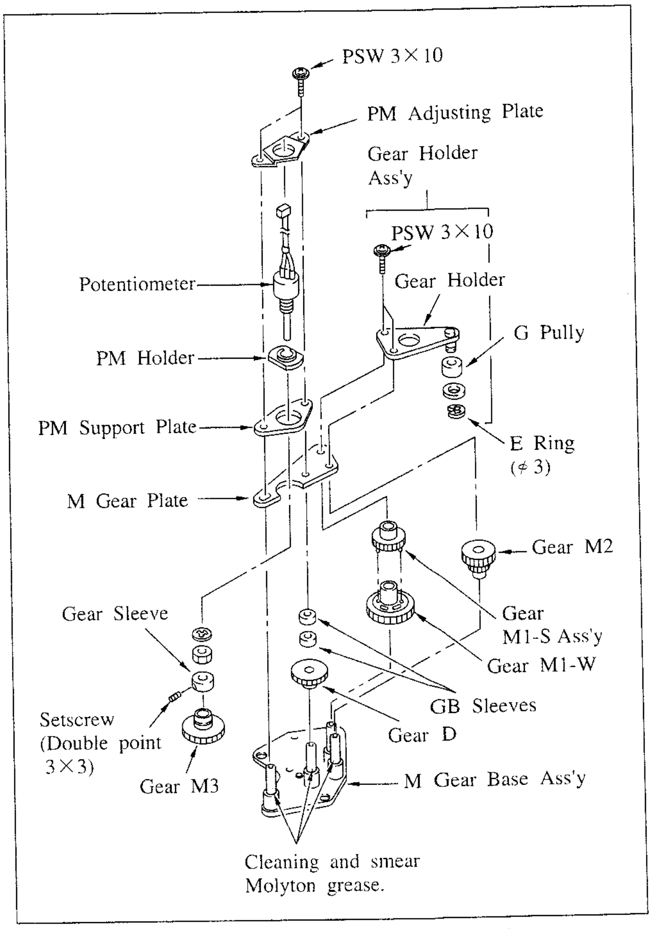

PSW 3×10
PM Adjusting Plate
Gear Holder Ass'y
PSW 3×10
Gear Holder
G Pully
E Ring
(φ 3)
Potentiometer
PM Holder
PM Support Plate
M Gear Plate
Gear M2
Gear Sleeve
Gear
M1-S Ass'y
Gear M1-W
GB Sleeves
Setscrew
(Double point
3×3)
Gear D
Gear M3
M Gear Base Ass'y
Cleaning and smear
Molyton grease.

Fig. 6-17-15 M Gear Box Ass'y Replacement

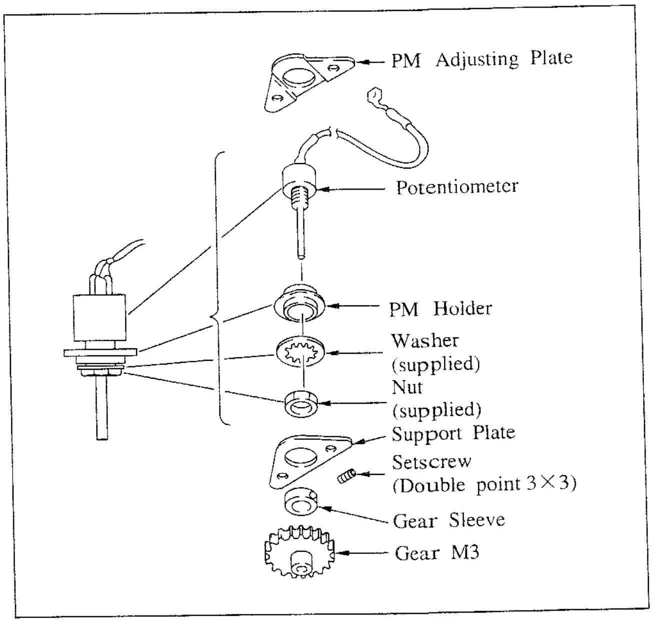

PM Adjusting Plate
Potentiometer
PM Holder
Washer
(supplied)
Nut
(supplied)
Support Plate
Setscrew
(Double point 3×3)
Gear Sleeve
Gear M3

Fig. 6-17-16 Potentiometer Installation

9. M2 Gear clearance adjustment (Fig. 6-17-17)

Basic Knowledge

The two screws shown in the figure must be temporarily fixed.

Adjustment

(1) Insert a 0.4 mm wire gauge to the contact portion between the Loading Gear (T) and the M2 Gear.

Note : Insert the wire gauge to the position where the bottom of the Loading Gear (T) tooth is closest to the top of the M2 Gear tooth.

(2) Tighten the two screws while pressing the M Gear Box Ass'y slightly in the direction indicated by arrow C.
(3) Remove the wire gauge and insert the following wire gauges. Confirm that the specification is met.

Specification : 0.3 mm wire gauge goes through
0.5 mm wire gauge does not go through.
If the specification is not met, repeat from step (1).

(4) Move the Loading Gear (T) by hand in the direction indicated by arrows D and E, and confirm that it moves smoothly.
After that, fix the Loading Gear (T) by aligning the longitudinal holes of Loading Gears (S) and (T) and the round holes of the Base Plate. (Refer to Fig. 6-17-12.)
(5) Temporarily set the Gear Holder Ass'y to the M Gear Box Ass'y with two screws. (Refer to Fig. 6-17-18.)

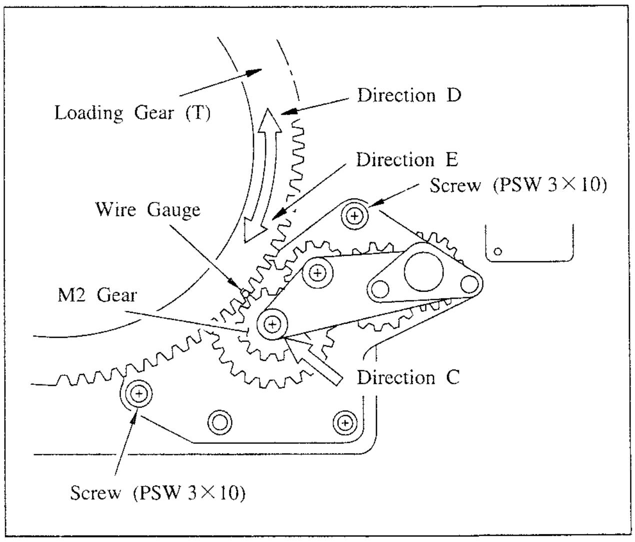


Fig. 6-17-17 M2 Gear Clearance Adjustment

10. Gear Holder clearance adjustment (Fig. 6-17-18)
(1) Insert a 0.1 mm thickness gauge between the Loading Gear (T) and pulley G of the Gear Holder Ass'y as shown in the figure.
(2) Tighten the two screws while pressing the Gear Holder Ass'y in the direction indicated by arrow F.
(3) Remove the thickness gauge and turn Pulley G by hand to check that it moves smoothly.

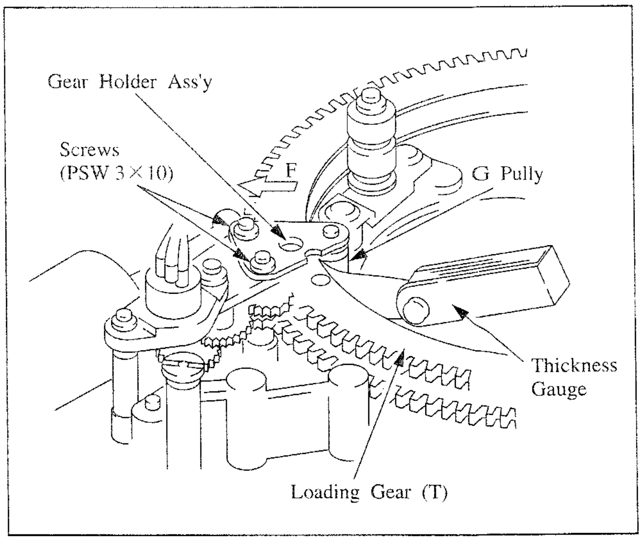


Fig. 6-17-18 Gear Holder Clearance Adjustment

11. Loading Motor Ass'y installation
    Install the Loading Motor Ass'y to the machine in the reverse order of step 2 in Section 6-16.

12. Loading Motor/Worm Gear clearance adjustment
    Refer to step 5 of Section 6-16.

13. Unthreading-end position setting (Fig. 6-17-19)
    - By hand, turn the Worm Gear of the Loading Motor shown in the figure in the direction indicated by arrow B, and set the Loading Gear to the unthreading-end.
      At this time, confirm that the round holes of the Loading Gears (S) and (T) are aligned with those of the Base Plate when they are viewed from above.

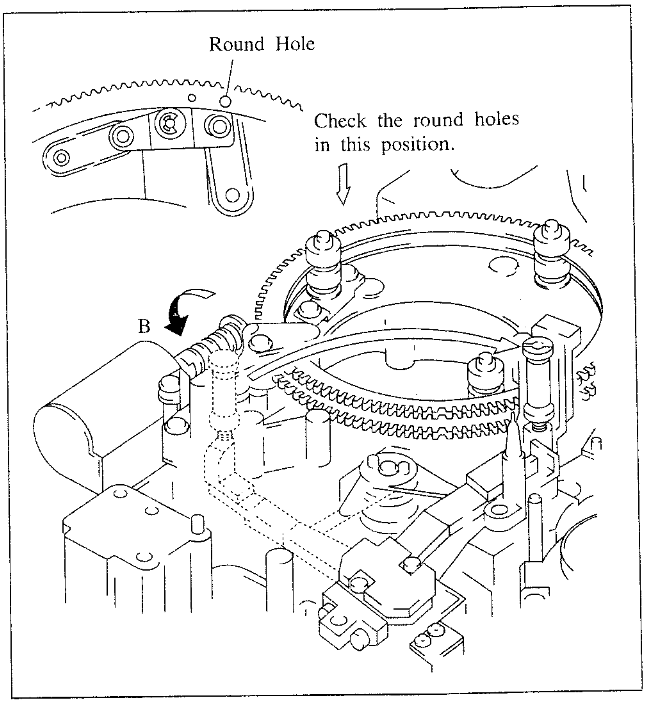


Fig. 6-17-19 Unthreading-end Position Setting

14. Potentiometer position adjustment
    Refer to Section 6-17-3.

15. Drum Base Block installation
    Refer to steps 6 and 7 in Section 6-17-1.

    Note : Hold the LD Rail when installing the Drum Base Block. Do not touch the Drum (especially the head chip).

16. Joint Plate installation
    Install the Joint Plate by reversing the procedure in Step 1.

17. Tape transport adjustment
    Refer to Section 9.

6-17-3. Potentiometer position Adjustment

Basic Knowledge

A. This potentiometer detects the threading-end position and the unthreading-end position of the Loading Gear.

B. Be sure to make this adjustment after replacing components of the M Gear Box Ass'y and the Loading Gear Ass'y.

1. Turn on the machine.

2. Set the machine to the checker mode by pressing keys on the control panel in the following sequence.

   [BKDV-101]
   TEST , F6 (CHECKER), F1 (SP)

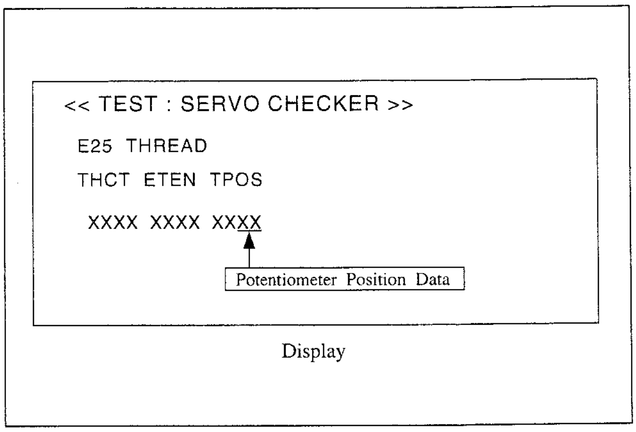
   [BKDV-200 series]
   ① SHIFT + SET UP
   ② ENTRY + center key + search dial (or ∨ key) to enter the <TEST> menu.
   Turn the search dial clockwise or press ∨ key to select 807. [CHECKER MODE].
   ③ Press the > key to move the cursor to EXECUTE.
   ④ Press the ∧ key to enter CHECKER mode.

3. Display the position data of the potentiometer on the display shown in Fig. 6-17-20 by pressing keys on the control panel in the following sequence.

   [BKDV-101]
   F5 (E), 2 , 5 , SET

   [BKDV-200 series]
   INPUT CHECK + 4 (E), 2 , 5 , SET

   E can be input by selecting it the search dial and F1 (ALPH SET) key as well. (Refer to Section 6-(1)-4)



```
<< TEST : SERVO CHECKER >>
E25 THREAD
THCT ETEN TPOS
XXXX XXXX XXXX
```

Fig. 6-17-20 Potentiometer Position Data Display (BKDV-101)

4. Set the Loading Gear to the threading-end by turning the Worm Gear of the Loading Motor shown in Fig. 6-17-21 in the arrow A direction with fingers.
   Make sure that the round hole of the Loading Gear (S)/(T) and the round hole of the Base Plate are matched when seen from the top.

   Note : Be sure to turn the gear in the threading direction to match the holes. If you turn the Worm Gear too far, turn the Worm Gear in the arrow B direction once, and then turn it again in the unthreading direction to match the holes.
   For the Loading Gear (S), do not mistake the round hole for the longitudinal hole.

5. Make sure that the position data of the threading-end satisfies the specification.

   Specification : ED±0 (HEX.)
   If the specification is satisfied, go to step 9.

```
E25   THREAD
THCT  ETEN  TPOS
XXXX  XXXX  XXXX
```

Address Data

Potentiometer Position Data (HEX)

   If the specification is not satisfied, go to step 6.

6. Loosen the two adjusting screws shown in Fig. 6-17-22 by turning them about twice.

7. Hold the potentiometer with fingers and turn it clockwise until the position data satisfies the specification.

   Note : Be sure to turn the potentiometer clockwise. If you turn it too far turn it back counterclockwise and adjust it again.

8. Tighten the two adjusting screws.

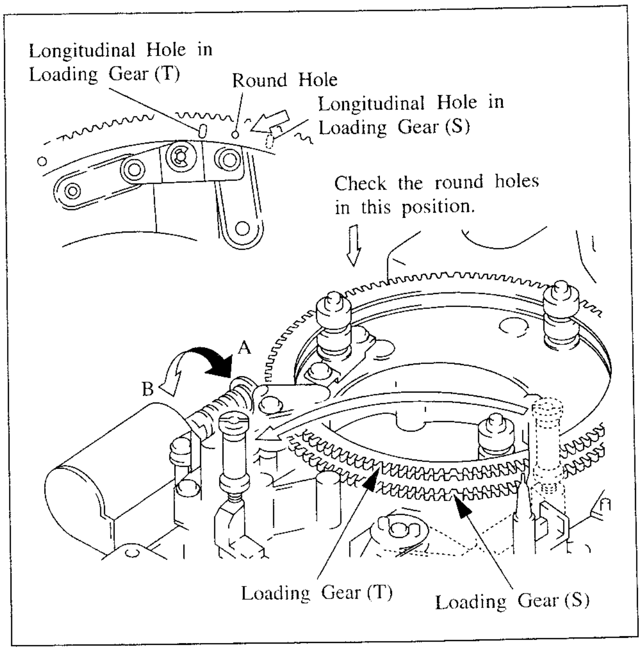

Longitudinal Hole in Loading Gear (T)
Round Hole
Longitudinal Hole in Loading Gear (S)
Check the round holes in this position.
A
B
Loading Gear (T)
Loading Gear (S)

Fig. 6-17-21 Threading-end Position Setting

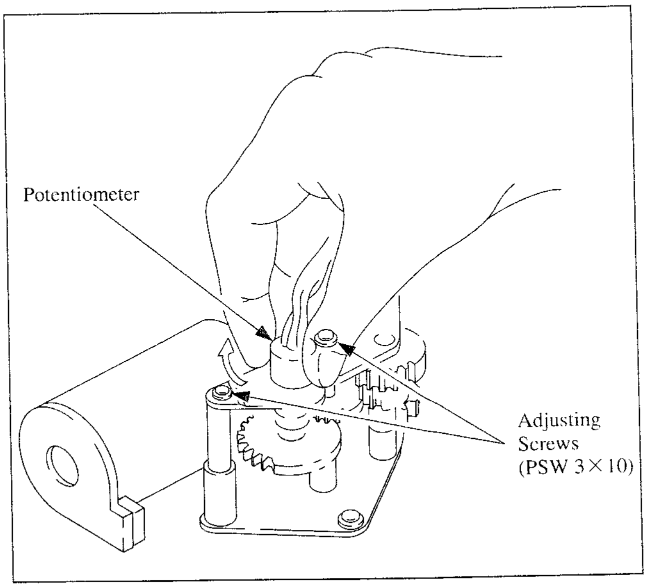

Potentiometer
Adjusting Screws (PSW 3×10)

Fig. 6-17-22 Potentiometer Position Adjustment

9. Set the Loading Gear to the unthreading-end by turning the Worm Gear of the Loading Motor shown in Fig. 6-17-23 in the arrow B direction with fingers.
   Make sure that the round hole (large) of the Loading Gear (S) /(T) and the round hole of the Base Plate are matched when seen from the top.

   Note : Be sure to turn the gear in the unthreading direction to match the holes. If you turn the Worm Gear too far, turn the Worm Gear in the arrow B direction once, and then turn it again in the threading direction to match the holes.
   For the Loading Gear (S), do not mistake the round hole (large) for the round hole (small).

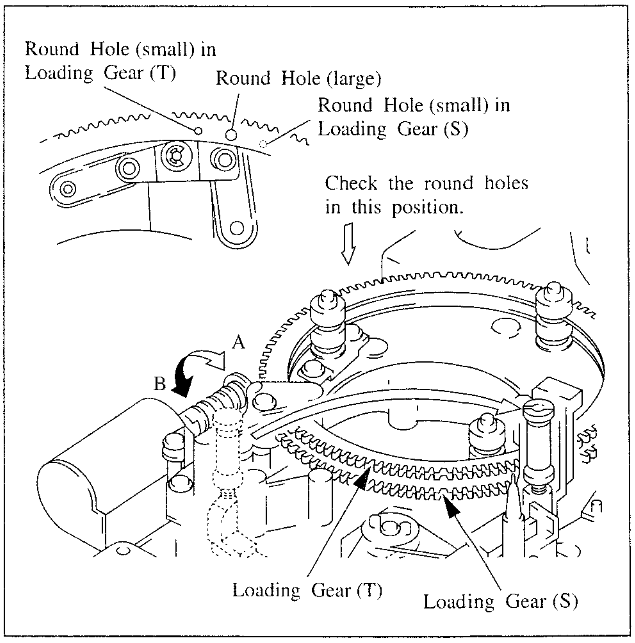
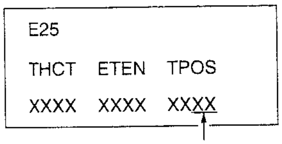

Round Hole (small) in Loading Gear (T)
Round Hole (large)
Round Hole (small) in Loading Gear (S)
Check the round holes in this position.
A
B
Loading Gear (T)
Loading Gear (S)

Fig. 6-17-23 Unthreading-end Position Setting

10. Make sure that the position data of the unthreading-end satisfies the specification.



```
E25
THCT  ETEN  TPOS
XXXX  XXXX  XXXX
```

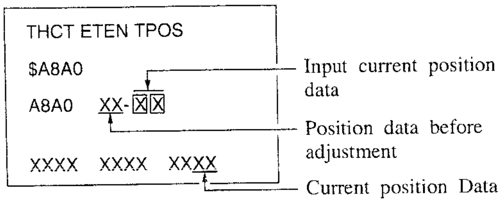
Potentiometer Position Data (HEX)

Then, input the potentiometer position data of the unthreading-end by pressing keys on the control panel in the following sequence.

[BKDV-101]
[F7] ($), [F1] (A), [8] , [F1] (A), [0] , [SET]

[BKDV-200 series]
(i) [F2] ($)
(ii) Entry A8A0 by pressing the monitor select keys.
[INPUT CHECK] + [0] (A), [8] , [INPUT CHECK] +
[0] (A), [0] , [SET]

A can be input by selecting it the search dial and [F1] (ALPH SET) key as well. (Refer to Section 6-(1)-4.)



```
THCT ETEN TPOS
$A8A0
A8A0  XX-XX
XXXX  XXXX  XXXX
```

Input current position data
Position data before adjustment
Current position Data

11. Transfer the data to NOVRAM by pressing keys on the control panel in the following sequence.
    [BKDV-101]
    SET , F10 (NVM), SET
    Then, keep pressing the / key until "PUSH NVWR SW" is shown on the display.

    [BKDV-200 series]
    (1) F4 (NVW)
    (2) SET of the monitor select key
    (3) Keep pressing the F3 (/) key until "PUSH NVWR SW" is shown on the display.

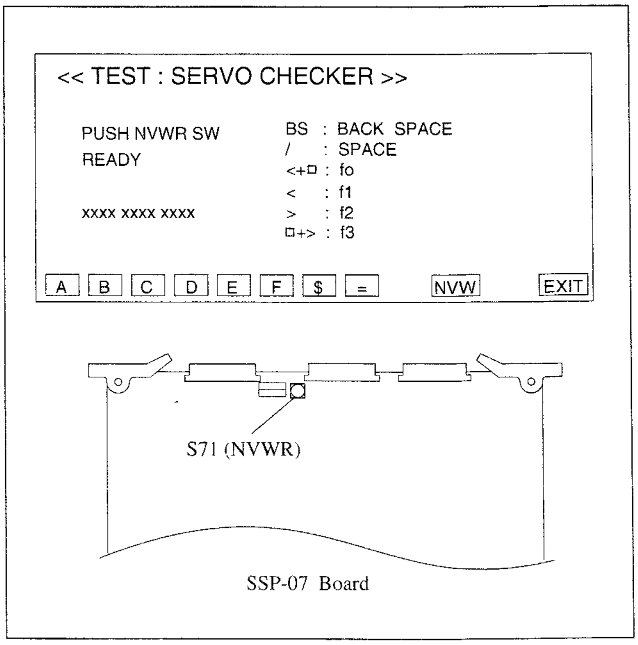
12. When "PUSH NVWR SW" appears on the display, press the S71 switch (NVWR) of the SSP-07 Board shown in Fig. 6-17-24 and make sure that "READY" is shown on the display.

13. Reset the unit by carrying out the following ① or ②.
    ① Turn off the power temporarily.
    ② Press the keys on the control panel in the following sequence.
    [BKDV-101]
    F8 (=), 0 , SET

    [BKDV-200 series]
    SHIFT , F4 (=), 0 , SET

14. Repeat steps 2 through 5 and make sure that the potentiometer position data of the threading-end satisfies the specification.

15. Turn off the power.



```
<< TEST : SERVO CHECKER >>

PUSH NVWR SW          BS  : BACK SPACE
READY                 /   : SPACE
                      <+□ : fo
                      <   : f1
xxxx xxxx xxxx        >   : f2
                      □+> : f3
```

Fig. 6-17-24 Control Panel Display (BKDV-101)

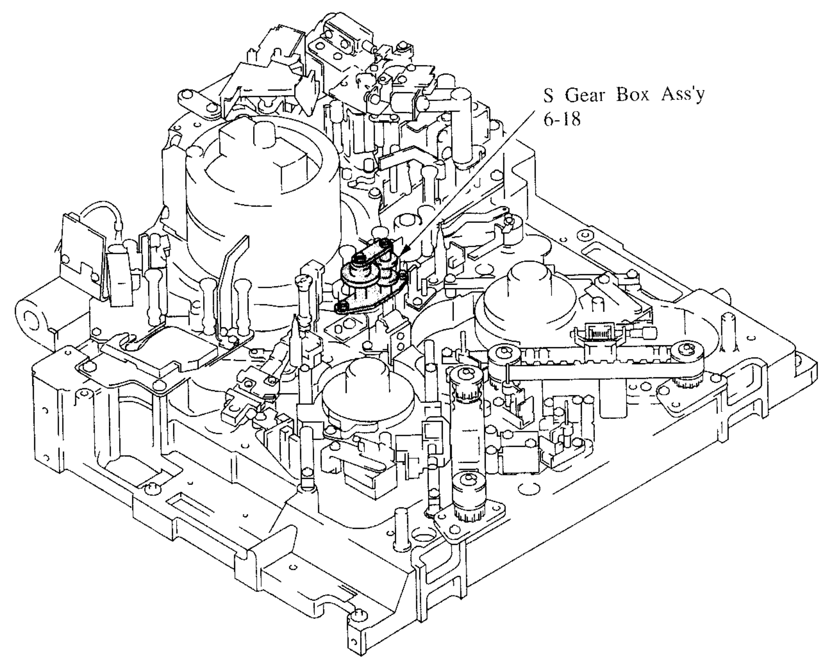
6-18. S GEAR BOX ASS'Y REPLACEMENT

Basic Knowledge

A. Fig. 6-18-1 shows the S Gear Box Ass'y block.
To replace components of the block, the Drum Ass'y must be removed together with the Drum Base.

B. Prepare the following tools.

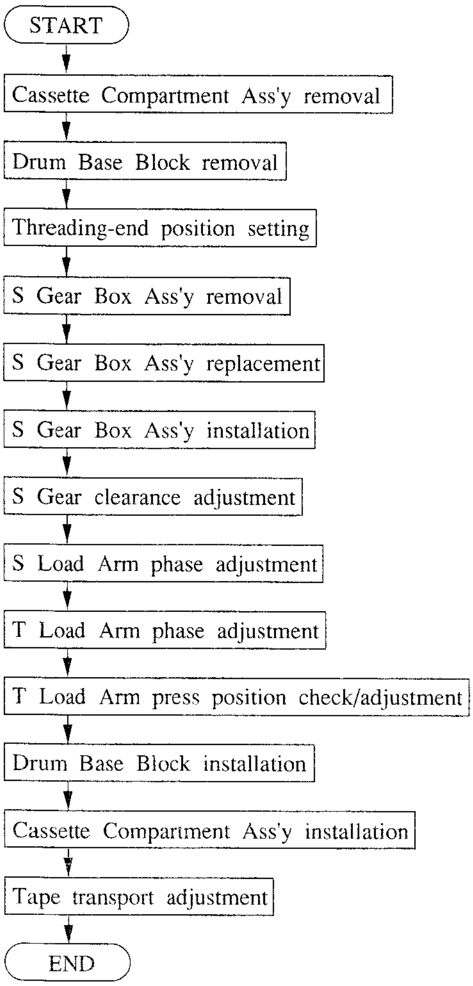
- RG Set Pin
  Sony Parts No. : J-6254-650-A
- Wire gauge set
  Sony Parts No. : J-6152-450-A
- Molyton grease
  Sony Parts No. : 7-662-001-41
- Cleaning liquid (or the equivalent)
  Sony Parts No. : 9-919-573-00



(This illustration is DVR-28)

Fig. 6-18-1 S Gear Box Ass'y

C. Replacement flowchart


START
Cassette Compartment Ass'y removal
Drum Base Block removal
Threading-end position setting
S Gear Box Ass'y removal
S Gear Box Ass'y replacement
S Gear Box Ass'y installation
S Gear clearance adjustment
S Load Arm phase adjustment
T Load Arm phase adjustment
T Load Arm press position check/adjustment
Drum Base Block installation
Cassette Compartment Ass'y installation
Tape transport adjustment
END

Removal

1. Cassette Compartment Ass'y removal
   Reter to Section 6-5.

2. Drum Base Block removal
   Refer to Section 6-17-1.

3. Threading-end position setting (Fig. 6-18-2)
   (1) By hand, turn the Worm Gear of the Loading Motor shown in the figure in the direction indicated by arrow A, then set the S/T Arm Ass'y to the threading-end.
   At this time, confirm that the Longitudinal holes of the Loading Gears (S) and (T) shown in the figure are aligned with the round holes of the Base Plate when they are viewed from above.
   (2) Insert the RG Set Pin to the hole, then fix the Loading Gear.

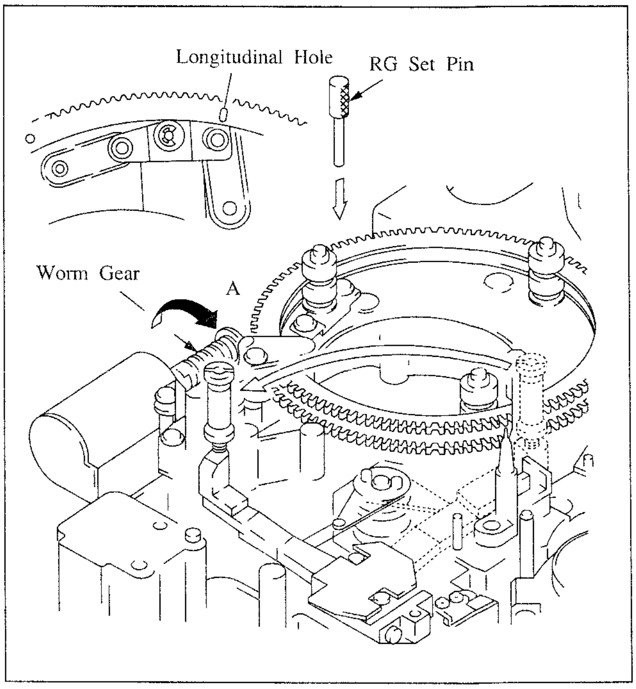

Longitudinal Hole
RG Set Pin
Worm Gear
A

Fig. 6-18-2 Threading-end position Setting

4. S Gear Box Ass'y removal (Fig. 6-18-3)
   (1) Remove the screw fixing the LD Bracket, then remove the LD Bracket.
   (2) Remove the two screws fixing the S Gear Box Ass'y, then remove the S Gear Box Ass'y.

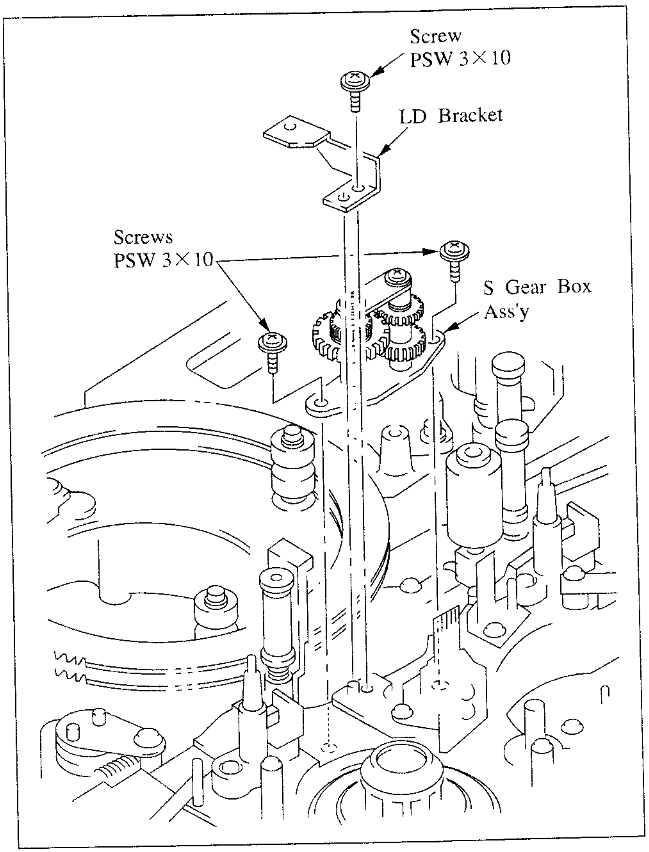

Screw
PSW 3×10
LD Bracket
Screws
PSW 3×10
S Gear Box Ass'y

Fig. 6-18-3 S Gear Box Ass'y Installation

Replacement

5. S Gear Box Ass'y replacement (Fig. 6-18-4)
   (1) Remove the two screws fixing the S Gear Plate, then disassemble the S Gear Box Ass'y as shown in the figure.
   (2) Replace the necessary components.

Note : When replacing parts of the gear section, wipe the surface of the shaft shown in the figure with a cloth moistened with cleaning liquid. Then, smear a small amount of Molyton grease to the surface of the shaft.

Turn the S Gear by hand and confirm that it turns smoothly.

Installation/Adjustment

6. S Gear Box Ass'y installation
   - Mount the S Gear Box Ass'y to the machine using two screws.
     Do not mount the LD Bracket at this stage.

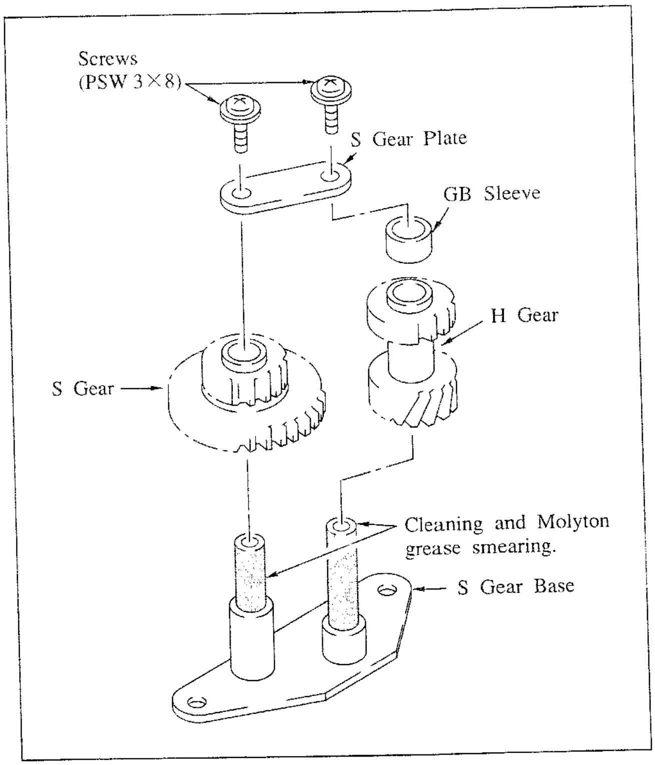

Screws
(PSW 3×8)
S Gear Plate
GB Sleeve
H Gear
S Gear
Cleaning and Molyton grease smearing.
S Gear Base

Fig. 6-18-4 Components Replacement

7. S Gear clearance adjustment (Fig. 6-18-5)

Basic Knowledge

The two screws fixing the S Gear Base shown in the figure must be temporarily fixed.

Adjustment

(1) Insert a 0.4 mm wire gauge to the contact portion between the Loading Gear (S) and the S Gear.

Note : Insert the wire gauge to the position where the top of the Loading Gear (S) tooth is closest to the bottom of the S Gear tooth.

(2) Tighten the two screws while pressing the S Gear Box Ass'y slightly in the direction indicated by arrow A.

(3) Remove the wire gauge and insert the following wire gauges. Confirm that the specification is met.

Specification : 0.3 mm wire gauge goes through.
0.5 mm wire gauge does not go through.
If the specification is not met, repeat from step (1).

(4) If the specification is met, smear a small amount of Molyton grease to each gear portion of the S Gear Box Ass'y.

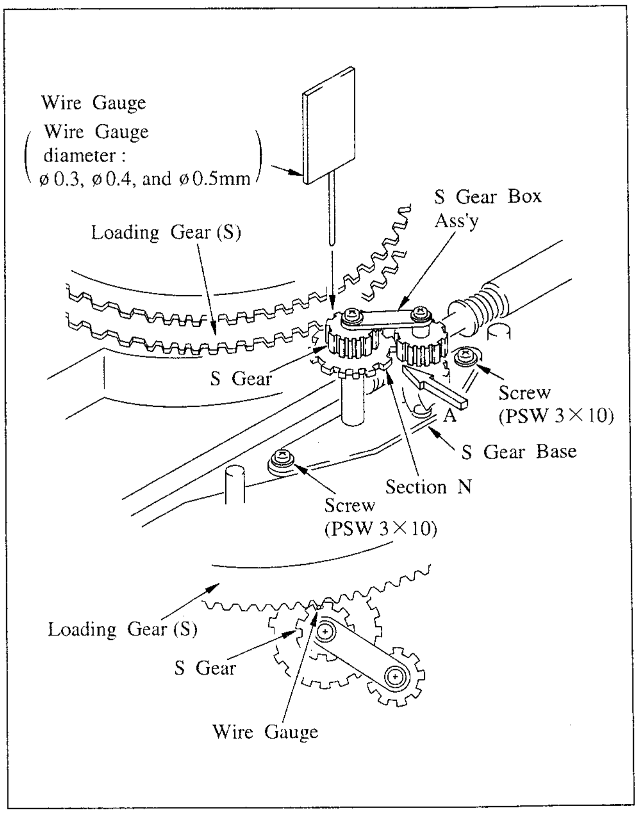

Wire Gauge
(Wire Gauge diameter : ø0.3, ø0.4, and ø0.5mm)
S Gear Box Ass'y
Loading Gear (S)
S Gear
Screw (PSW 3×10)
A
S Gear Base
Section N
Screw (PSW 3×10)
Loading Gear (S)
S Gear
Wire Gauge

Fig. 6-18-5 S Gear Clearance Adjustment

8. S Load Arm phase adjustment
Refer to Section 6-19.

9. T Load Arm phase adjustment
Refer to Section 6-19.

10. RG Set Pin removal
- Remove the RG Set Pin mounted in Step 3.

11. T Load Arm press position check/adjustment
Refer to Section 6-26-1.

12. Drum Base Block installation
Refer to Section 6-17-1.
Install the LD Bracket removed in Step 4 before installing the Drum Base Block.

13. Cassette Compartment Ass'y installation
Refer to Section 6-5.

14. Tape transport adjustment
Refer to Section 9.

6-19. MAIN SHAFT ASS'Y REPLACEMENT

Basic Knowledge

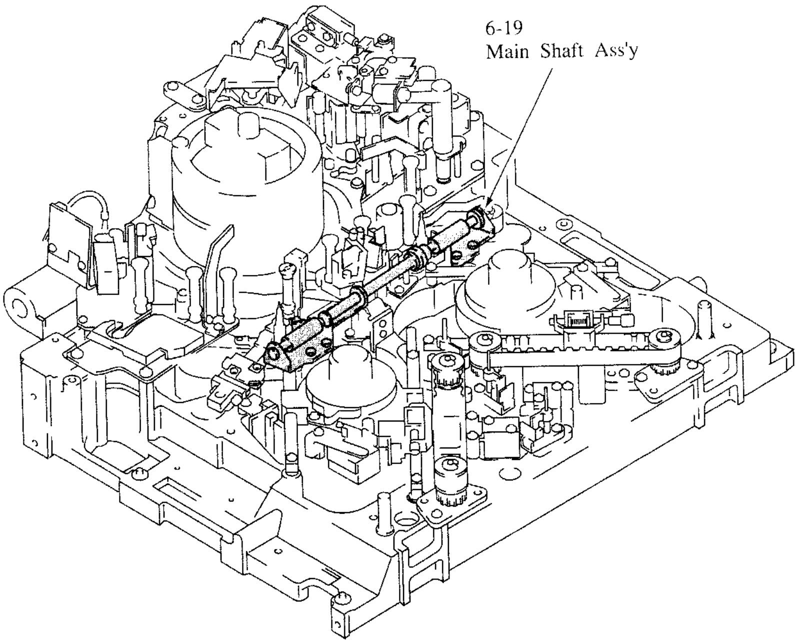
A. Fig. 6-19-1 shows the Main Shaft Ass'y block.
To replace parts of the block, it is necessary to remove the following blocks:
- Cassette Compartment Ass'y
- Drum Base Block
- S Guide Base Ass'y
- T Guide Base Ass'y
- S Gear Box Ass'y
- S Load Arm Ass'y
- T Load Arm Ass'y

B. The shape of the part of the Main Shaft Ass'y vary with the serial numbers of the units. But the replacement procedures are all the same.

Applicable Serial Numbers

DVR-28 (UC)	S/N	12101 and higher
DVR-28P (UC)	S/N	11201 and higher
DVR-28P (EK)	S/N	11701 and higher

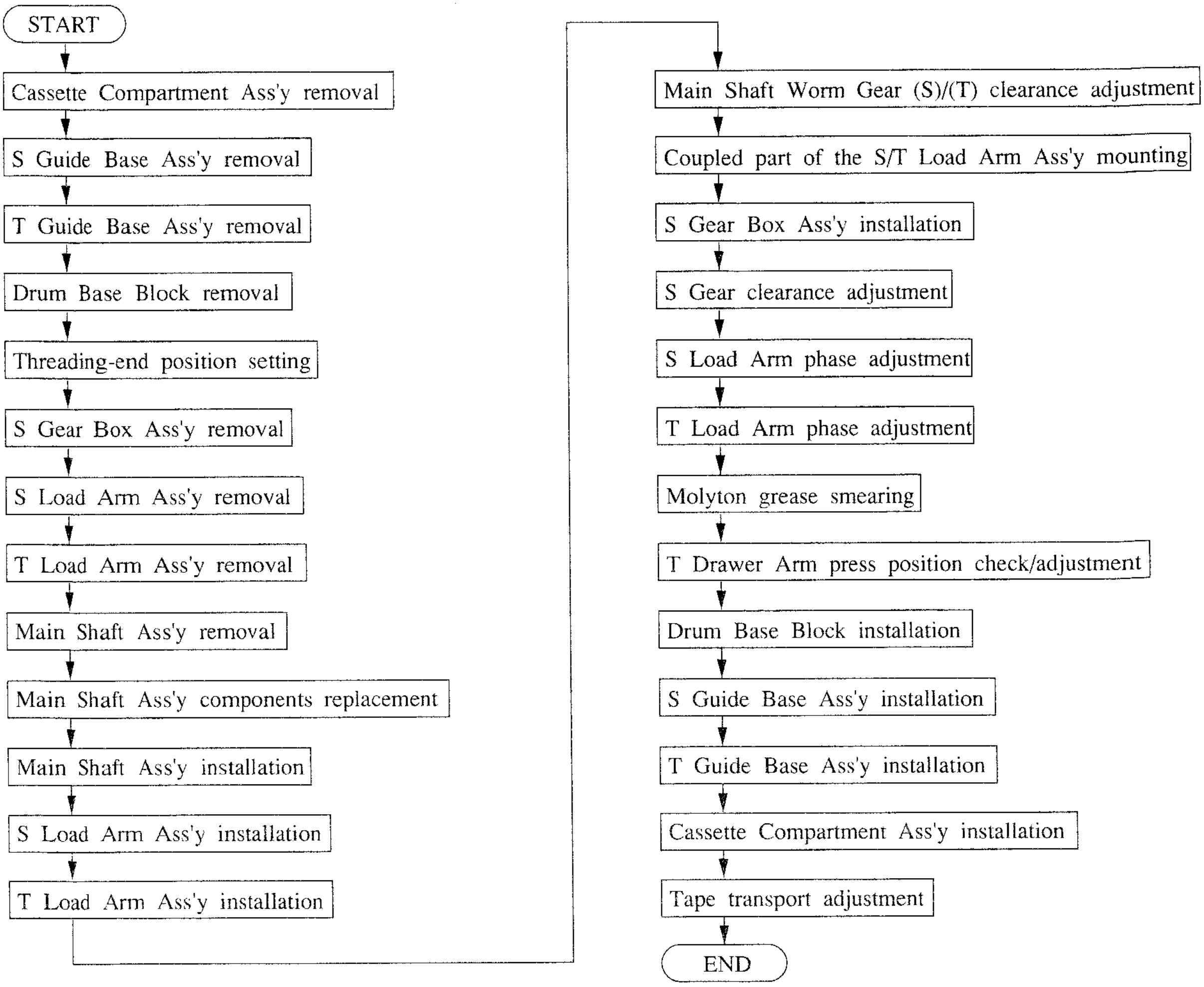
C. Prepare the following tools.
- Wire gauge set
  Sony Parts No.: J-6152-450-A
- RG Set Pin
  Sony Parts No.: J-6254-650-A
- Molyton grease
  Sony Parts No.: 7-662-001-41
- Locking compound (Screw lock)



(This illustration is DVR-28)

Fig. 6-19-1 Main Shaft Ass'y

D. Replacement flowchart


START
Cassette Compartment Ass'y removal
S Guide Base Ass'y removal
T Guide Base Ass'y removal
Drum Base Block removal
Threading-end position setting
S Gear Box Ass'y removal
S Load Arm Ass'y removal
T Load Arm Ass'y removal
Main Shaft Ass'y removal
Main Shaft Ass'y components replacement
Main Shaft Ass'y installation
S Load Arm Ass'y installation
T Load Arm Ass'y installation
Main Shaft Worm Gear (S)/(T) clearance adjustment
Coupled part of the S/T Load Arm Ass'y mounting
S Gear Box Ass'y installation
S Gear clearance adjustment
S Load Arm phase adjustment
T Load Arm phase adjustment
Molyton grease smearing
T Drawer Arm press position check/adjustment
Drum Base Block installation
S Guide Base Ass'y installation
T Guide Base Ass'y installation
Cassette Compartment Ass'y installation
Tape transport adjustment
END

Removal

1. Cassette Compartment Ass'y removal
   Refer to Section 6-5.

2. S Guide Base Ass'y removal (Fig. 6-19-2)
   (1) Dismount the Tape Protector by removing the screw which locks the Protector.
   (2) Disconnect the connector from the PC-63 Board and remove the harness from the wire clamp.
   (3) Dismount the S Guide Base Ass'y by removing the two screws that lock the Ass'y.

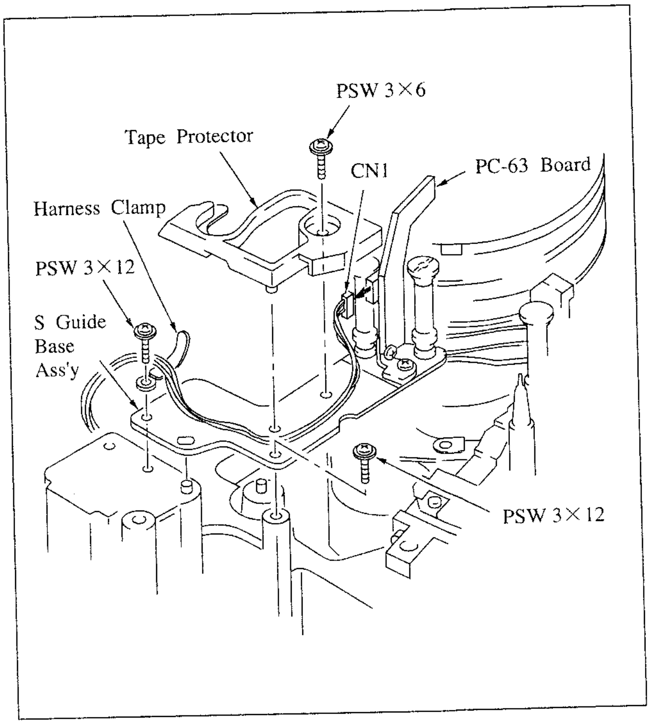

PSW 3×6
Tape Protector
CN1
PC-63 Board
Harness Clamp
PSW 3×12
S Guide Base Ass'y
PSW 3×12

Fig. 6-19-2 S Guide Base Ass'y Removal

3. T Guide Base Ass'y removal
   (1) Remove the spring hook from the Pinch Press Plate shown in Fig. 6-19-3.
   Note : When remove the spring, not change its figure.

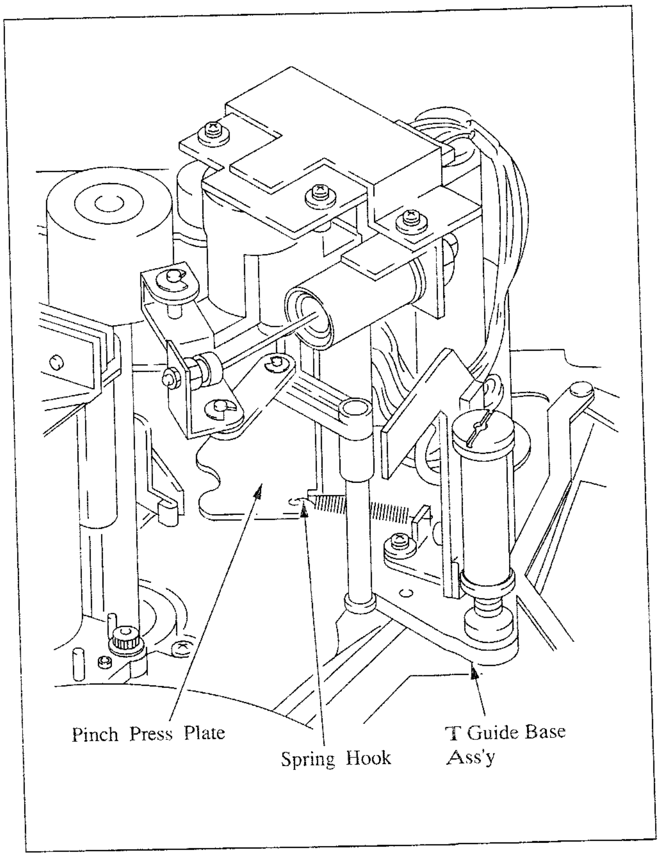

Pinch Press Plate
Spring Hook
T Guide Base Ass'y

Fig. 6-19-3 Spring Hook Removal

(2) Remove the connector that is connected to the PC-63 Board, and remove the harnesses from the harness clamps (2 places).
(3) Remove the two screws that lock the T Guide Base Ass'y, then remove the T Guide Base Ass'y.

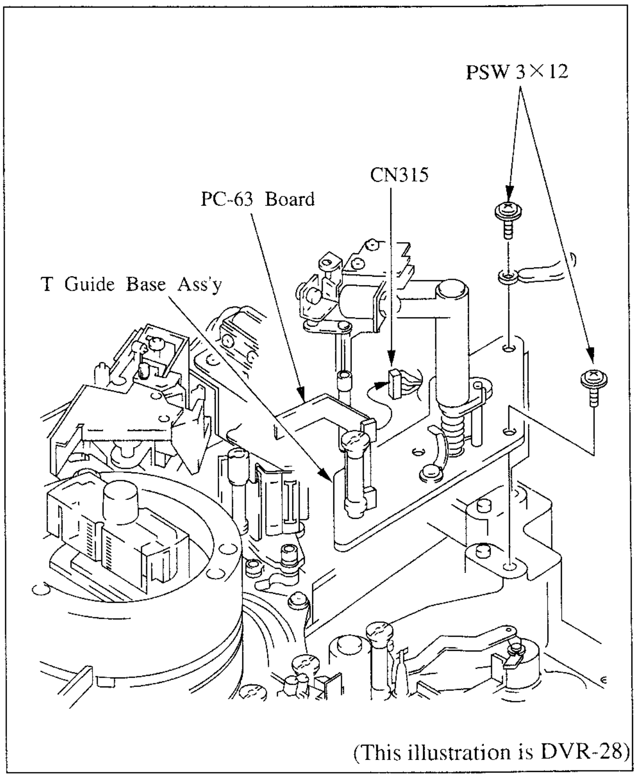

PSW 3×12
CN315
PC-63 Board
T Guide Base Ass'y
(This illustration is DVR-28)

Fig. 6-19-4 T Guide Base Ass'y Removal

4. Drum Base Block removal
   Refer to Section 6-17-1.

5. Threading-end position setting (Fig. 6-19-5)
   (1) Set the S/T Arm Ass'y to the threading-end by turning the Worm Gear part of the Loading Motor shown in the figure in the direction indicated by arrow A with fingers. Make sure that the longitudinal hole of the two Loading Gears (S)/(T) and the round hole of the Base Plate are matched when seen from above.
   (2) Fix the Loading Gears by inserting the RG Set Pin to the holes.

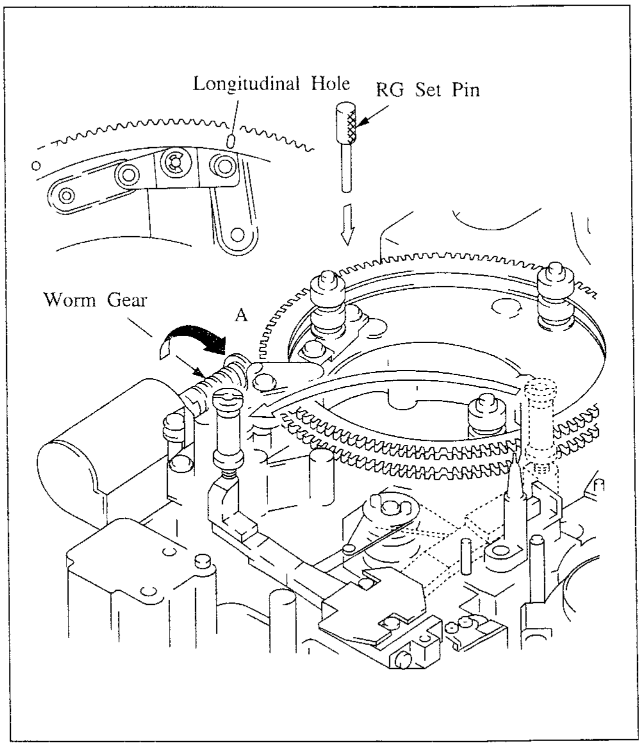

Longitudinal Hole
RG Set Pin
Worm Gear
A

Fig. 6-19-5 Threading-end Position Setting

6. S Gear Box Ass'y Removal (Fig. 6-19-6)
   1. (1) Remove the screw that locks the LD Bracket and dismount the Bracket.
   2. (2) Remove the two screws that lock the S Gear Box Ass'y and dismount the S Gear Box Ass'y.

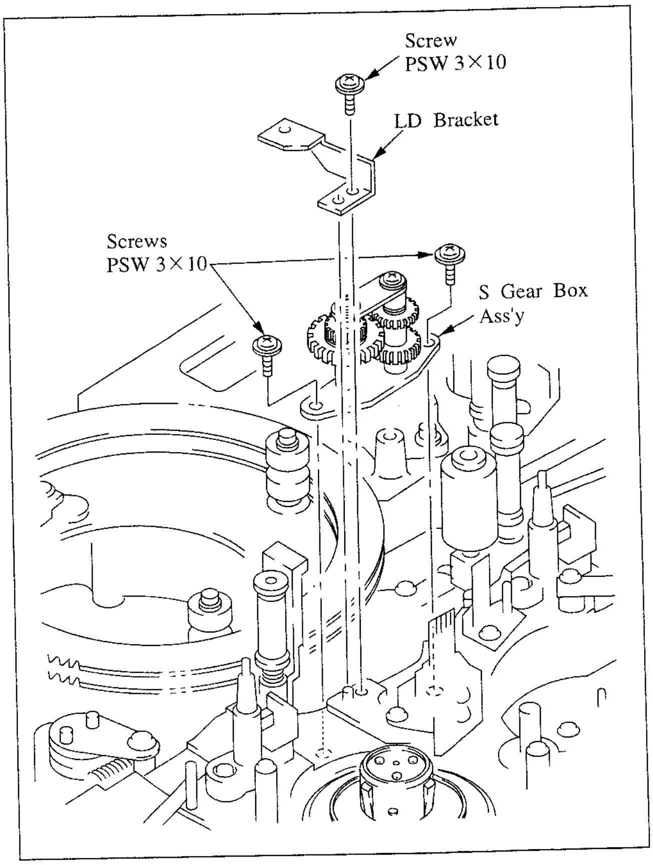

Screw
PSW 3×10
LD Bracket
Screws
PSW 3×10
S Gear Box
Ass'y

Fig. 6-19-6 S Gear Box Ass'y Removal

7. S Load Arm Ass'y removal
   1. (1) Remove the E ring shown in Fig. 6-19-7 and dismount the shaft of the S Load Link.
   2. (2) Remove the screw that locks the S Load Arm Ass'y and dismount the Ass'y.

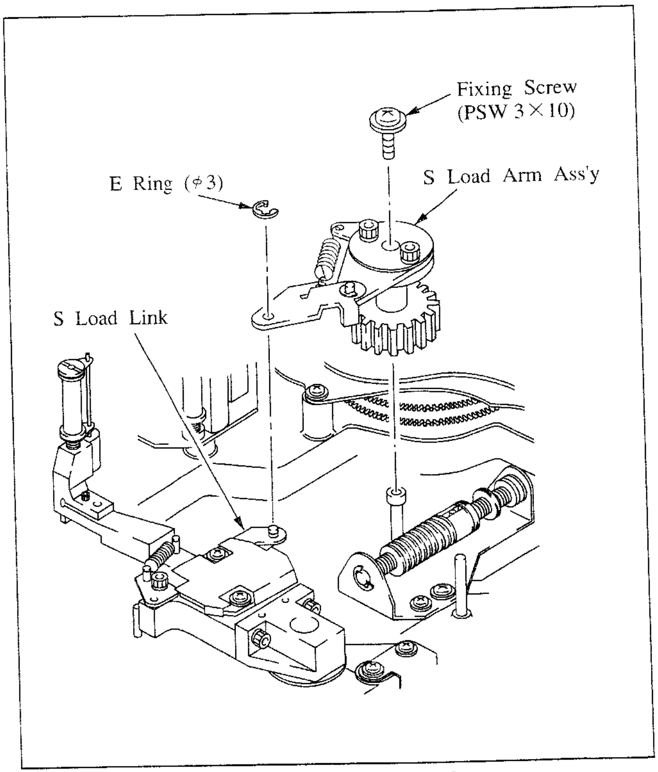

Fixing Screw
(PSW 3×10)
E Ring (φ3)
S Load Arm Ass'y
S Load Link

Fig. 6-19-7 S Load Arm Ass'y Removal

8. T Load Arm Ass'y removal
   (1) Remove the E ring shown in Fig. 6-19-8 and remove the T Load Link from the T load Arm Ass'y.
   (2) Remove the screw that locks the T Load Arm Ass'y and dismount the Ass'y.

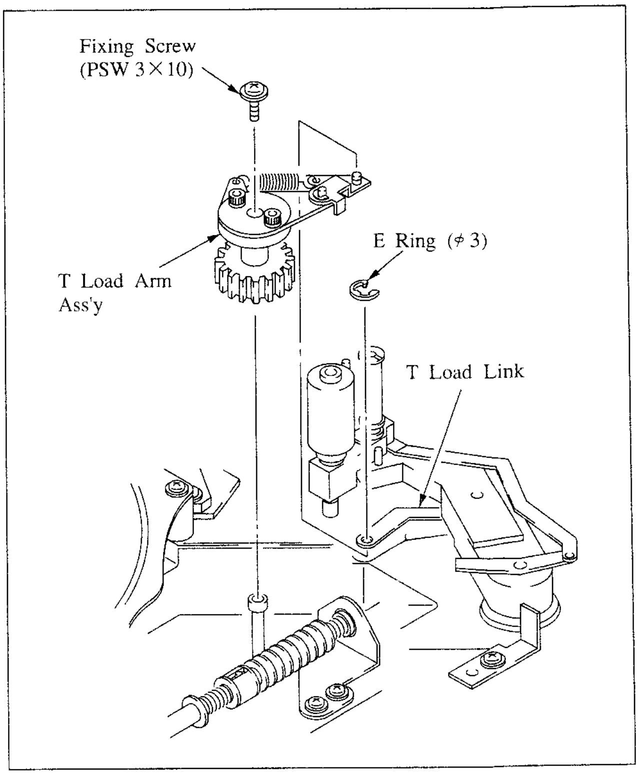

Fixing Screw
(PSW 3×10)
E Ring (φ3)
T Load Arm
Ass'y
T Load Link

Fig. 6-19-8 T Load Arm Ass'y Removal

9. Main Shaft Ass'y removal (Fig. 6-19-9)
   - Remove the five screws that lock the Main Shaft Ass'y and dismount the Ass'y.

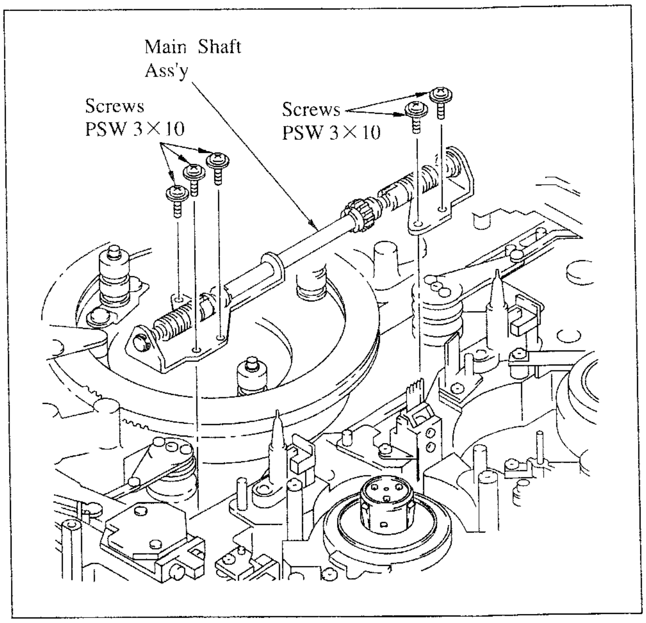

Main Shaft
Ass'y
Screws
PSW 3×10
Screws
PSW 3×10

Fig. 6-19-9 Main Shaft Ass'y Removal

Replacement/Installation

10. Main Shaft Ass'y Components replacement (Fig. 6-19-10)
    - Replace the components that must be replaced. Use the white color of the Worm Gear at the S side and use the black color of the Worm Gear at the T side.

Note : The shape of the *4-marked parts vary with the serial numbers of the units.

11. Main Shaft Ass'y installation
    - Mount the Main Shaft Ass'y by reversing the step 9 procedure. Leave the five screws temporarily locked.

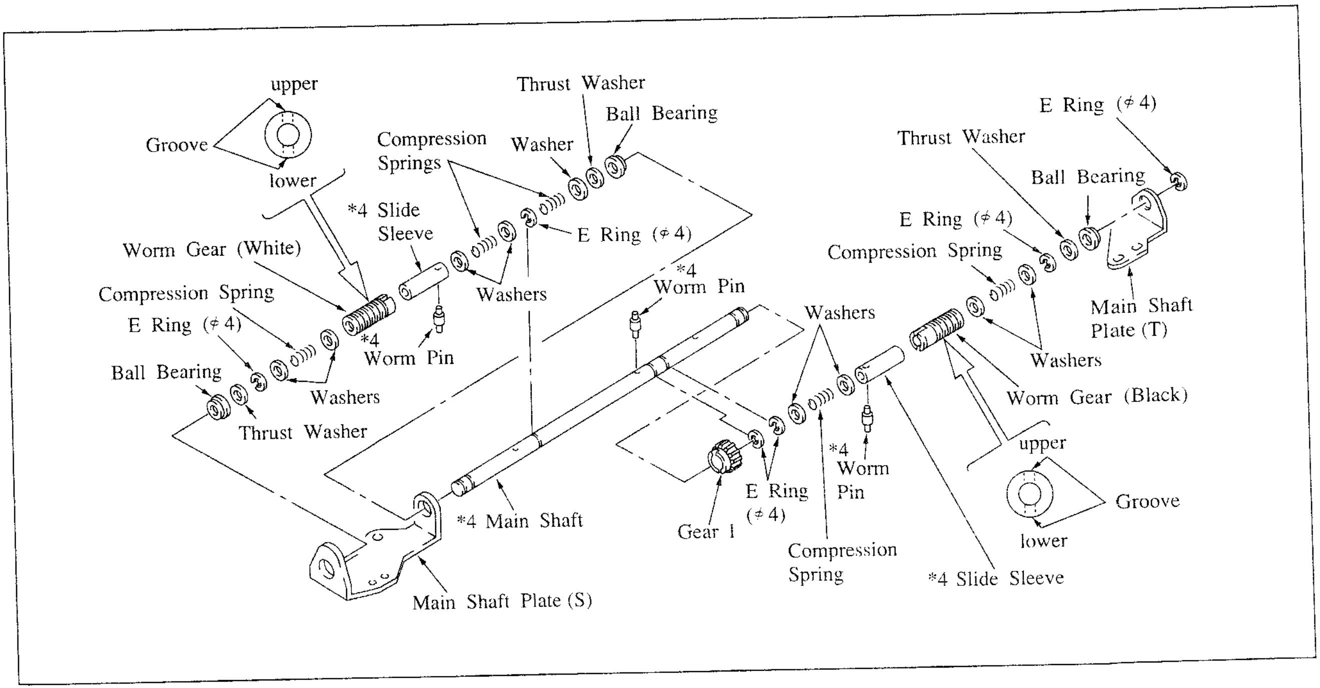

upper
Groove
lower
Thrust Washer
Ball Bearing
Compression Springs
Washer
*4 Slide Sleeve
E Ring (φ 4)
Worm Gear (White)
Compression Spring
E Ring (φ 4)
Ball Bearing
*4 Worm Pin
Washers
Washers
Thrust Washer
*4 Worm Pin
*4 Main Shaft
Main Shaft Plate (S)
E Ring (φ 4)
Thrust Washer
Ball Bearing
E Ring (φ 4)
Compression Spring
Washers
Main Shaft Plate (T)
Washers
Worm Gear (Black)
upper
Groove
lower
*4 Worm Pin
E Ring (φ 4)
Gear 1
Compression Spring
*4 Slide Sleeve

Fig. 6-19-10 Components Replacement

[Replacement Procedure of the *4-marked Parts]

Applicable Serial Numbers

DVR-28 (UC)	S/N	12201 and higher
DVR-28P (UC)	S/N	11201 and higher
DVR-28P (EK)	S/N	11801 and higher

It is possible to replace the part or block of the Main Shaft Ass'y as shown in Fig. 6-9-10. when replacing the Worm Gear (white/black) or Gear 1, remove Spring Pin. When removing the Spring Pin, replace the Spring Pin with a new one. Install the Spring pin as shown in Fig. 6-19-10 (a).

- Spring Pin : Sony Part No. 7-626-301-31

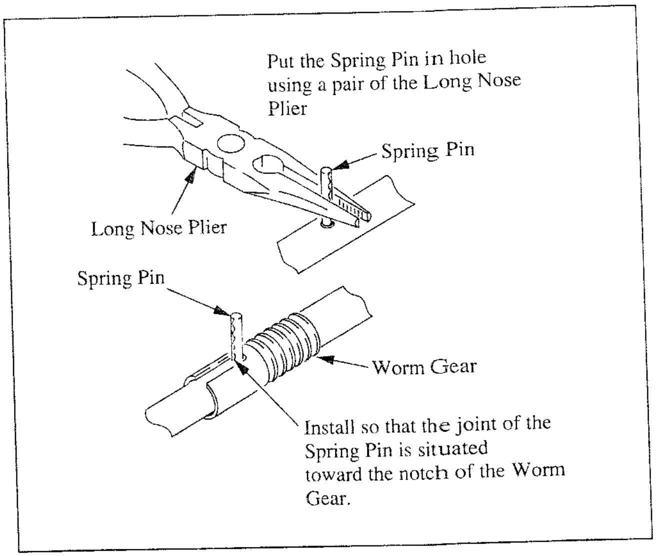

Put the Spring Pin in hole using a pair of the Long Nose Plier
Spring Pin
Long Nose Plier
Spring Pin
Worm Gear
Install so that the joint of the Spring Pin is situated toward the notch of the Worm Gear.

Fig. 6-19-10 (a) Spring Pin Installation

12. S Load Arm Ass'y installation (Fig. 6-19-11)
    1. (1) Press the S Tension Regulator Ass'y in the direction indicated by arrow A.
       Make sure that the S Tension Regulator Ass'y contacts at the stopper.
    2. (2) Move the S Load Link so that the D side of the S Load Link is parallel against the Main Shaft. (Fig. 1)
    3. (3) While maintaining the state of the step (2), mount the S Load Arm Ass'y on the machine making sure that the shaft of the S Load Link goes into the hole C of the S Load Arm Ass'y. (Do not couple them.)
    4. (4) Tighten the S Load Arm Ass'y with a fixing screw.

Note : Do not mount the joint section Ⓐ shown in Fig. 6-19-13 at this stage. Mount it after adjusting the Main Shaft Worm Gear (S)/(T) clearance.

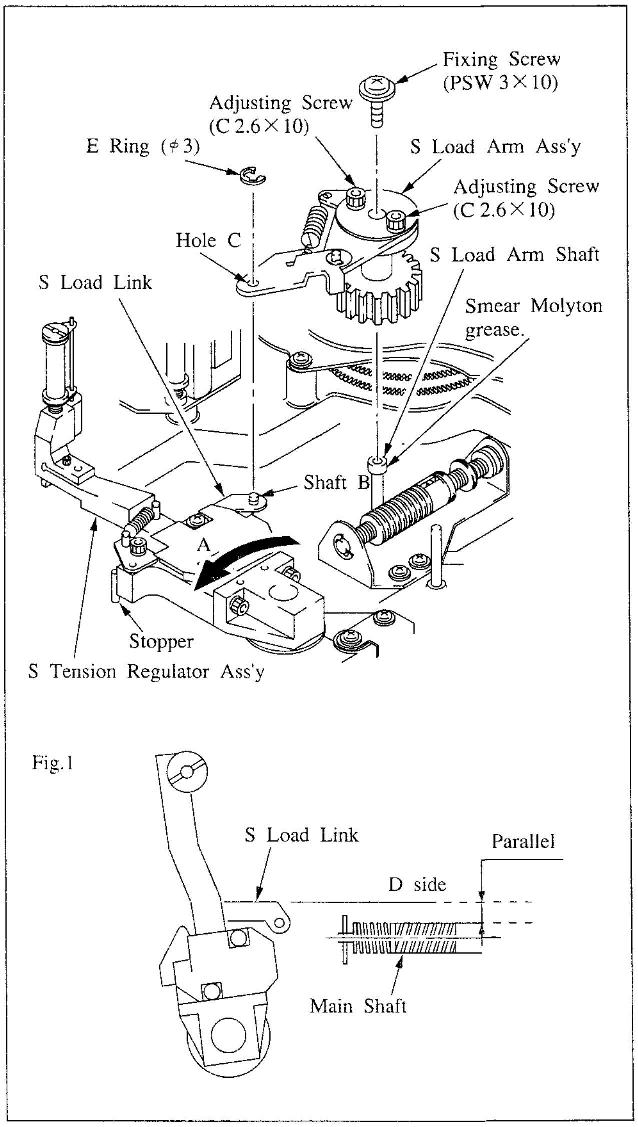

Fixing Screw
(PSW 3×10)
Adjusting Screw
(C 2.6×10)
E Ring (φ3)
S Load Arm Ass'y
Adjusting Screw
(C 2.6×10)
Hole C
S Load Arm Shaft
S Load Link
Smear Molyton grease.
Shaft B
A
Stopper
S Tension Regulator Ass'y
Fig.1
S Load Link
Parallel
D side
Main Shaft

Fig. 6-19-11 S Load Arm Ass'y Installation

13. T Load Arm Ass'y installation (Fig. 6-19-12)
    (1) Press the T Tension Regulator Ass'y in the direction indicated by arrow C.
        Make sure that the T Tension Regulator Ass'y contacts at the stopper.
    (2) Mount the T Load Arm Ass'y on the machine, making sure that the E side of the T Load Arm Ass'y and the F side of the Base Plate shown in the figure become parallel when observed visually.
    (3) Tighten the T Load Arm Ass'y with a fixing screw.

    Note : Do not mount the Joint section Ⓑ shown in the fig. 6-19-13 at this stage. Mount it after adjusting the Main Shaft (S)/(T) clearance.

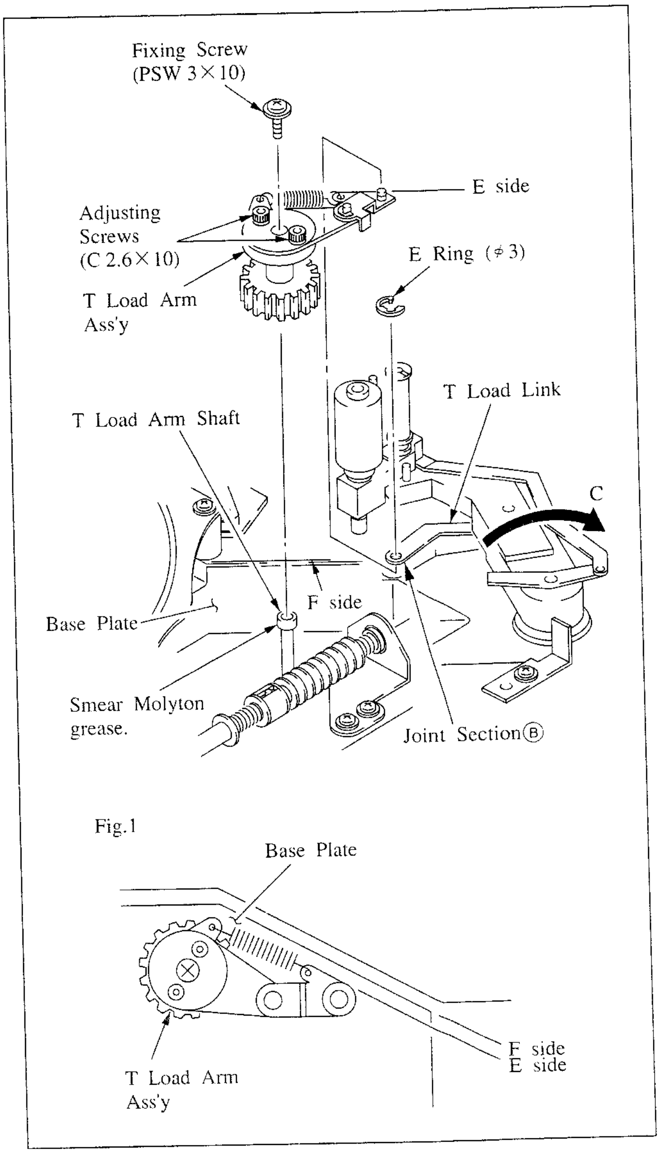

Fixing Screw
(PSW 3×10)
E side
Adjusting
Screws
(C 2.6×10)
E Ring (ϕ3)
T Load Arm
Ass'y
T Load Link
T Load Arm Shaft
C
F side
Base Plate
Smear Molyton
grease.
Joint Section Ⓑ
Fig.1
Base Plate
F side
E side
T Load Arm
Ass'y

Fig. 6-19-12 T Load Arm Ass'y Installation

Adjustment

14. Main Shaft Worm Gear (S)/(T) clearance adjustment

Basic Knowledge

- Leave the five screws (a) shown in Fig. 6-19-13 temporarily fixed. Carry out the Worm Gear (T) Clearance Adjustment, and then adjust the Worm Gear (S) clearance.

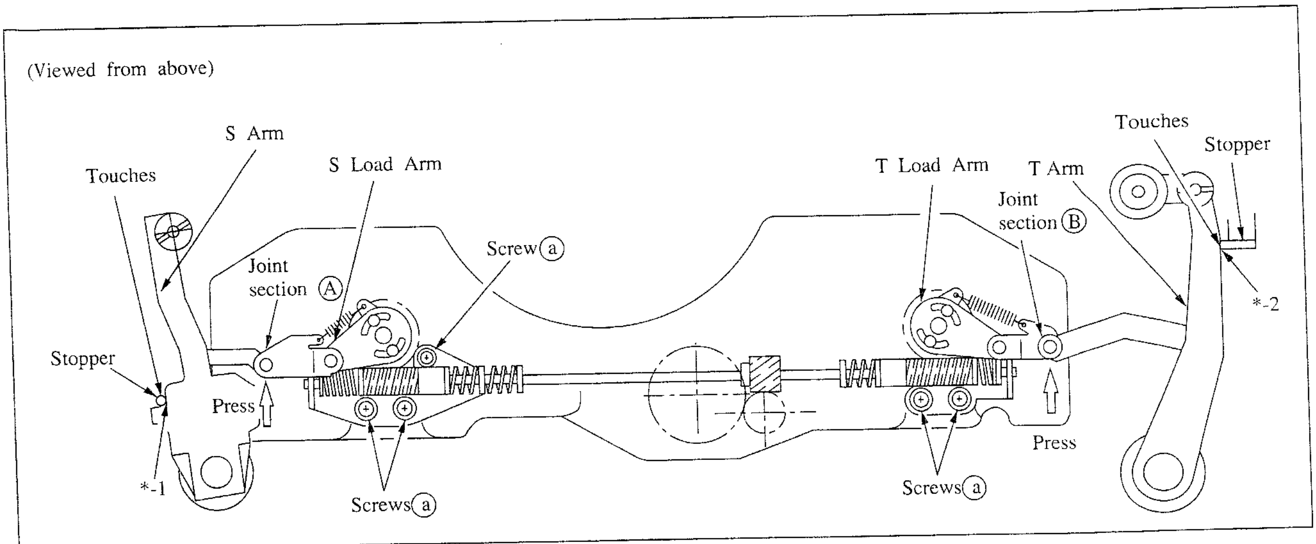

(Viewed from above)
S Arm
Touches
S Load Arm
Joint
section Ⓐ
Screw ⓐ
Stopper
Press
*-1
Screws ⓐ
T Load Arm
T Arm
Joint
section Ⓑ
Touches
Stopper
*-2
Press
Screws ⓐ

Fig. 6-19-13 Main Shaft Worm Gear (S)/(T) Clearance Adjustment

Main Shaft Worm Gear (T) clearance adjustment (Fig. 6-19-14)

(1) Insert a 0.4 mm wire gauge to the contact portion between the Worm Gear (black) and Worm Wheel (black) as shown in the figure.

Note : Insert the wire gauge to the position where the concave portion of the Worm Gear is the closest to the convex portion of the Worm Wheel.

(2) Tighten the two screws (a) while pressing the Main Shaft Plate (T) slightly in the direction indicated by arrow A.

(3) Remove the wire gauge, insert a wire gauge and confirm that the following specifications are met.

Specification : A 0.3 mm wire gauge goes through.
A 0.5 mm wire gauge does not go through.

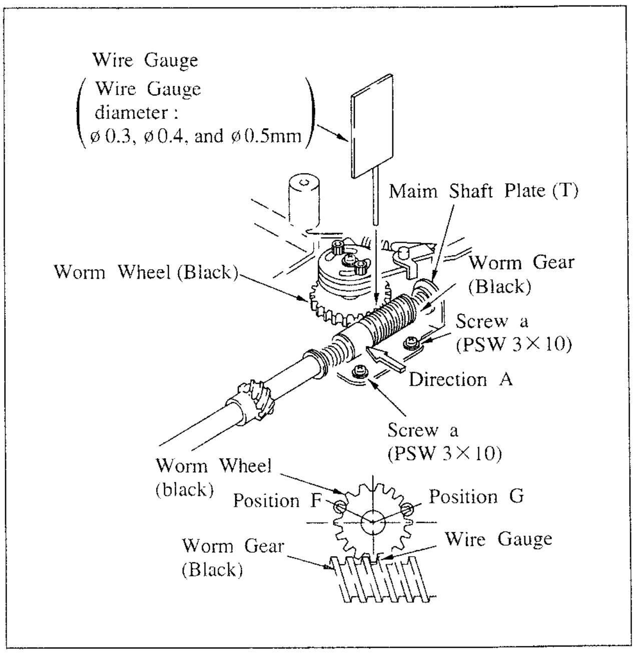

Wire Gauge
Wire Gauge diameter : ø 0.3, ø 0.4, and ø 0.5mm
Maim Shaft Plate (T)
Worm Wheel (Black)
Worm Gear (Black)
Screw a (PSW 3×10)
Direction A
Screw a (PSW 3×10)
Worm Wheel (black)
Position F
Position G
Worm Gear (Black)
Wire Gauge

Fig. 6-19-14 Main Shaft Worm Gear (T) Clearance Adjustment

Main Shaft Worm Gear (S) clearance adjustment (Fig. 6-19-15)

(4) Insert a 0.4 mm wire gauge to the contact portion between the Worm Gear (white) and the Worm Wheel (white) as shown in the figure.

Note : Insert the wire gauge to the position where the concave portion of the Worm Gear is closest to the convex portion of the Worm Wheel.

(5) Tighten the three screws (a) while pressing the Main Shaft Plate (S) slightly in the direction indicated by arrow B, then remove the wire gauge.

(6) Confirm that the Main Shaft is stable in the direction indicated by arrow C.

(7) Insert a wire gauge to the same position and confirm that the following specifications are met.

Specification : A 0.3 mm wire gauge goes through.
A 0.5 mm wire gauge cannot be inserted.

(8) Turn the main shaft in the direction indicated by arrow D, insert the wire gauge to the contact portion between the E portion of the Worm Wheel (white) and the Worm Gear (white), then confirm that the following specification is met.

Specification : A 0.3 mm wire gauge goes through.
A 0.5 mm wire gauge does not go through.

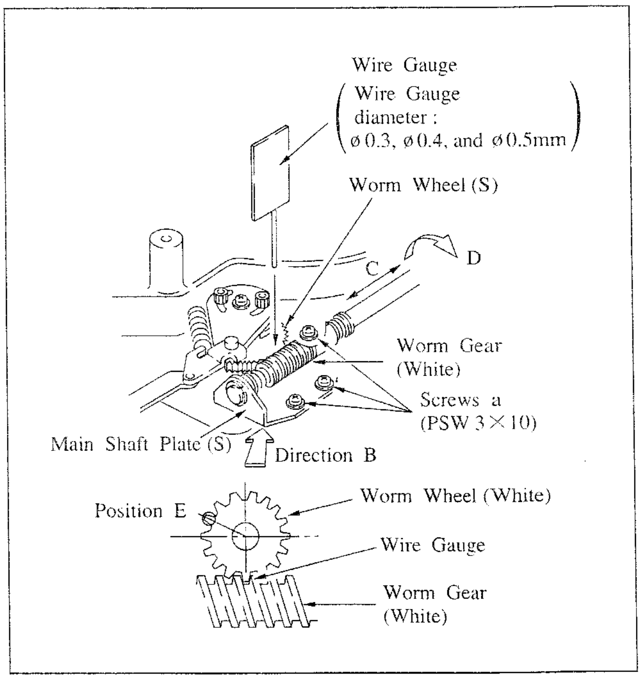

Wire Gauge
Wire Gauge diameter : ø 0.3, ø 0.4, and ø 0.5mm
Worm Wheel (S)
C
D
Worm Gear (White)
Screws a (PSW 3×10)
Main Shaft Plate (S)
Direction B
Position E
Worm Wheel (White)
Wire Gauge
Worm Gear (White)

Fig. 6-19-15 Main Shaft Worm Gear (S) Clearance Adjustment

Confirmation

(9) Turn the Main Shaft in the direction indicated by arrow D in Fig. 6-19-15, insert the wire gauge to the contact portion (shown in Fig. 6-19-14) between the F and G portions of the Worm Wheel (black) and the Worm Gear (black), then confirm that the following specification is met.

Specification : A 0.3 mm wire gauge goes through.
A 0.5 mm wire gauge does not go through.

If the specification is not met, repeat from step (1).

(10) Turn the Main Shaft by hand and confirm that it turns smoothly.

15. Joint section of the S/T Load Arm Ass'y mounting
    - Couple the S and T Load Arm Ass'ys to the S Load Link and the T Load Link, respectively, and lock them with E rings.

16. S Gear Box Ass'y installation (Fig. 6-19-16)
    (1) Press the joint section S or T by hand so that the S/T Drawer Arm touches the stopper. (See Fig. 6-19-13.) Fix the S Gear Box Ass'y to the Base Plate temporarily with two screws.
    (2) Mount the LD Bracket to the Base Plate.

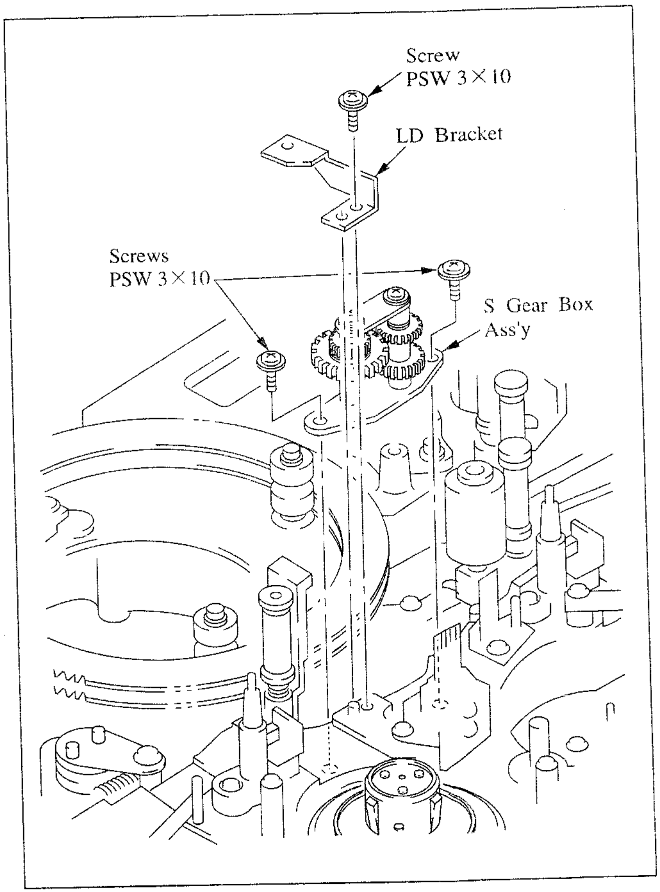


Fig. 6-19-16 S Gear Box Ass'y Installation

17. S Gear clearance adjustment (Fig. 6-19-17)

Basic Knowledge

The two screws shown in the figure must be in the temporarily fixed state.

Adjustment

(1) Insert the wire gauge (0.4mm) to the contact portion between the Loading Gear (S) and the S Gear.

Note : Insert the wire gauge to the position where the top portion of the Loading Gear (S) is the closest to the bottom portion of the S Gear.

(2) Tighten the two screws while pressing the S Gear Box Ass'y lightly in the direction indicated by arrow A.

(3) Pull out the wire gauge. Insert the following wire gauge to the same position and make sure that the specification is met.

Specification : A 0.3mm wire gauge can be inserted.
A 0.5mm wire gauge cannot be inserted.

If the specification is not met, start from the step 17 again.

(4) When the specification is met, smear a small amount of Molyton grease to the gears of the S Gear Box Ass'y.

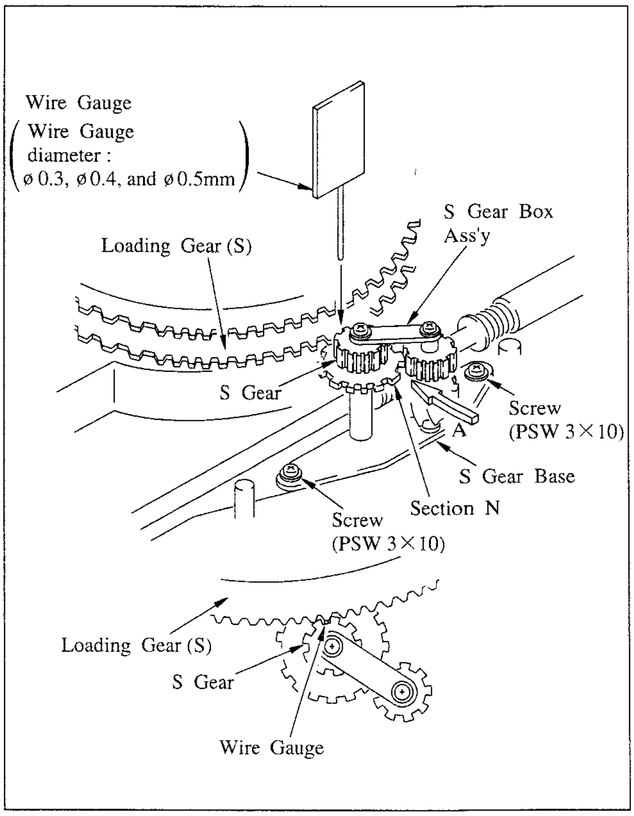

Wire Gauge
(Wire Gauge diameter : ø0.3, ø0.4, and ø0.5mm)
Loading Gear (S)
S Gear Box Ass'y
S Gear
Screw (PSW 3×10)
A
S Gear Base
Section N
Screw (PSW 3×10)
Loading Gear (S)
S Gear
Wire Gauge

Fig. 6-19-17 S Gear Clearance Adjustment

18. S Load Arm phase adjustment
    1. (1) Loosen the two screws shown in Fig. 6-19-18 by 1 to 2 turns.
       Use a 2.5 mm hexagonal wrench.
    2. (2) While pressing the K part of the S Load Arm with a finger in the direction indicated by arrow L, tighten the two screws by turning the Main Shaft in the direction N.
       Tightened torque : 68.6×10^{-2} N·m (7 kgf·cm)
    3. (3) Confirm that there is no clearance (shown in Fig. 1 of Fig. 6-19-18) between the Worm Gear (white) and washer.
       If the specification is not met, turn the gear (1) shown in Fig. 6-19-19 by hand by 1/8 turn in the direction indicated by arrow P, then repeat from step (1).

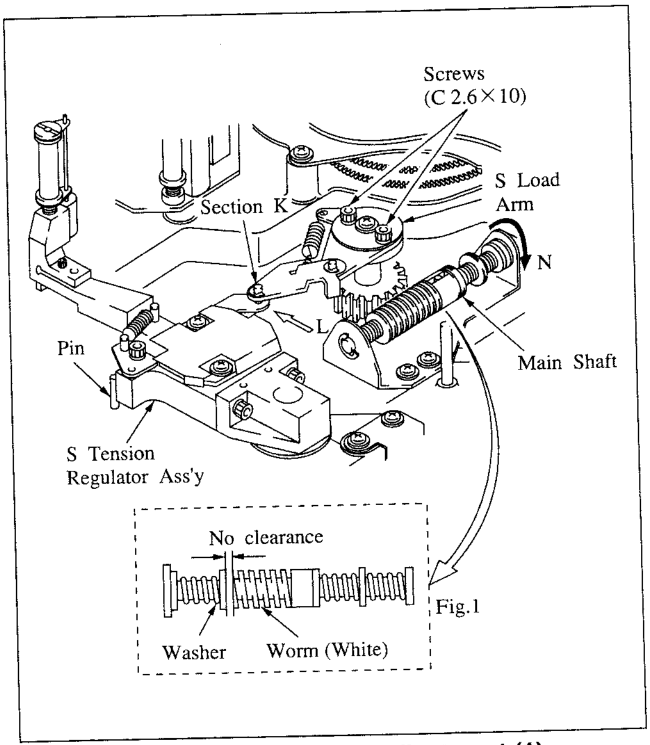


Fig. 6-19-18 S Load Arm Phase Adjustment (1)

(4) Turn the gear (1) in the direction indicated by arrow N, and stop it at the position where the S Tension Regulator Ass'y touches the pin.

(5) Confirm that there is no clearance (shown in Fig. 1 of Fig. 6-19-18) between the Worm Gear (white) and washer and that the S Tension Regulator Ass'y touches the pin.
If the specification is not met, repeat from step 14.

(6) When the specification is met, apply a small amount of Locking compound (Screw lock) to the heads of the two screws.

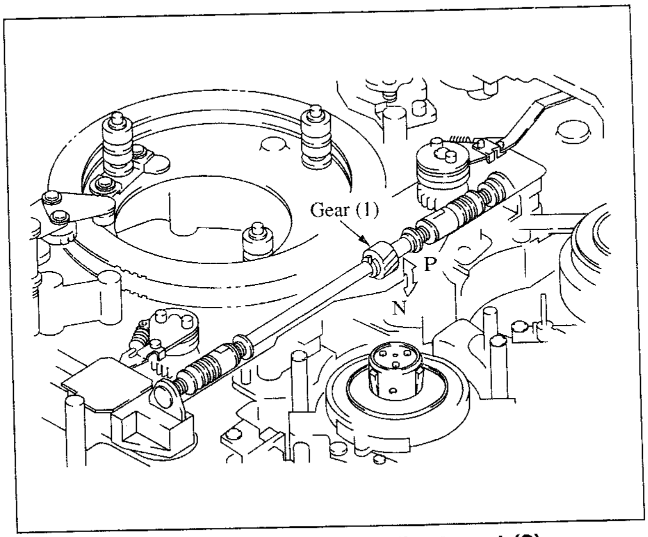


Fig. 6-19-19 S Load Arm Phase Adjustment (2)

19. T Load Arm phase adjustment (Fig. 6-19-20)
    1. (1) Loosen the two screws shown in the figure by 1 to 2 turns.
       Use a 2.5 mm hexagonal wrench.
    2. (2) Press the Q section of the T Load Arm by hand in the direction indicated by arrow R. While pressing the two screws in the direction indicated by arrow T to confirm looseness in the direction indicated by arrow S of the T5 Guide, tighten them.

       Specification : The looseness in the direction S of the T5 Guide: 0.5 mm or less
       Tightened torque : 68.6×10^{-2} N·m (7 kgf·cm)
    3. (3) Confirm that there is no clearance (shown in Fig. 1) between the Worm Gear (black) and the washer.
       If the specification is not met, turn the gear (1) shown in Fig. 6-19-19 by hand by 1/8 turn in the direction indicated by arrow P, then repeat from step (1).
    4. (4) Turn the gear (1) shown in Fig. 6-19-19 in the direction indicated by arrow N so that the looseness of the T5 Guide meets the specification.
    5. (5) Confirm that there is no clearance between the Worm Gear (black) and the washer (shown in Fig. 1) and that the looseness meets the specification of the step (2).
       If the specification is not met, repeat from step 14.
    6. (6) When the specification is met, apply a small amount of Locking compound (Screw lock) to the heads of the two screws.

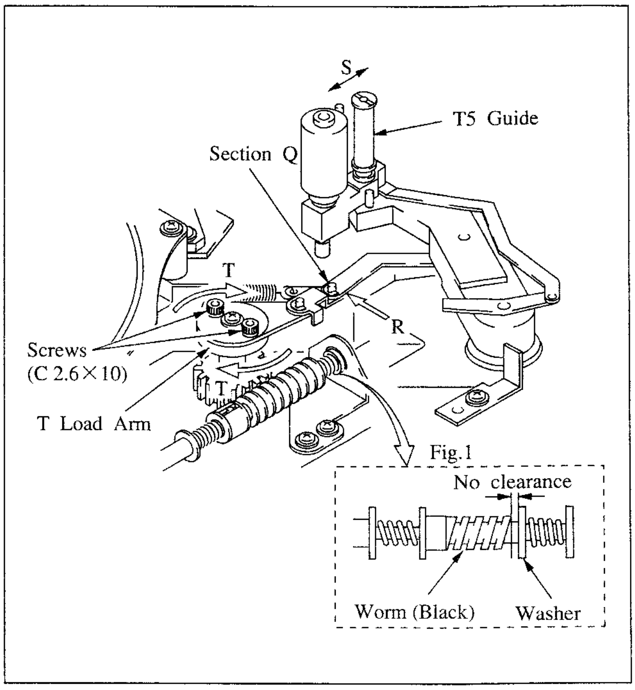


Fig. 6-19-20 T Load Arm Phase Adjustment

20. Molyton grease smearing (Fig. 6-19-21)
    - Smear a small amount of Molyton grease to the gears shown in Fig. 6-19-21.

21. T Drawer Arm press position check/adjustment
    Refer to Section 6-26-1.

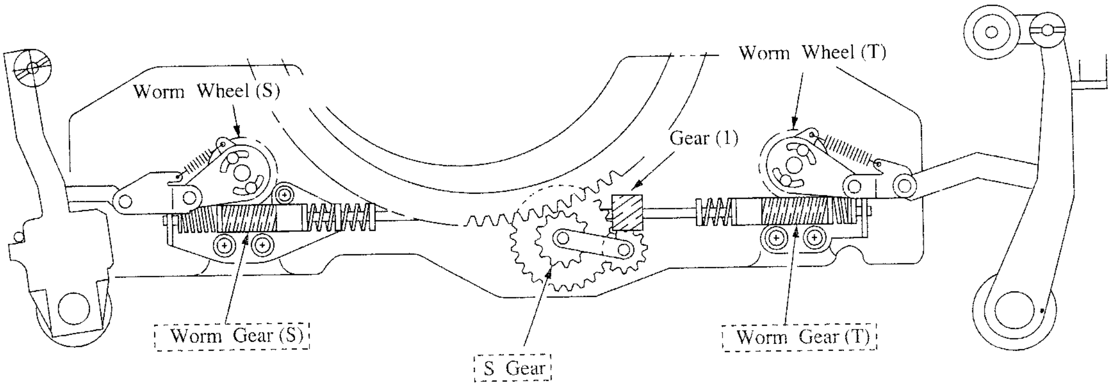
22. Drum Base Block installation
    Refer to steps 6 and 7 of Section 6-17-1.
    The RG Set Pin must be removed at installation of the Drum Base Block.

23. S Guide Base Ass'y installation
    Install the S Guide Base Ass'y in the reverse order of step 2.

24. T Guide Base Ass'y installation
    Install the T Guide Base Ass'y in the reverse order of step 3.

25. Cassette Compartment Ass'y installation
    Refer to Section 6-5.

26. Tape transport adjustment
    Refer to Section 9.



Smear Molyton grease

1. Worm Gear (S) / (T)
   Smear the grease properly to the space between the Worm Gear and Worm Wheel.
2. S Gear
   Smear the grease properly to the all dents of the gear.
3. Gear 1
   Smear the grease properly to the engaging section.

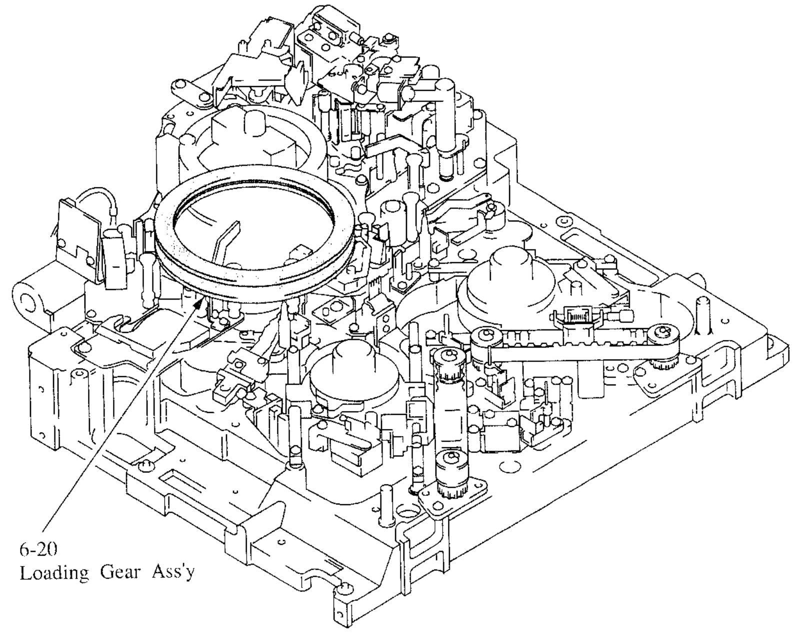
Fig. 6-19-21 Parts for Molyton Grease Smearing

6-20. LOADING GEAR ASS'Y REPLACEMENT

Basic Knowledge

A. The figure shows the Loading Gear Ass'y block.
To replace parts of this block, remove the following blocks:
- Cassette Compartment
- Drum Base Block
- Gear Holder Ass'y

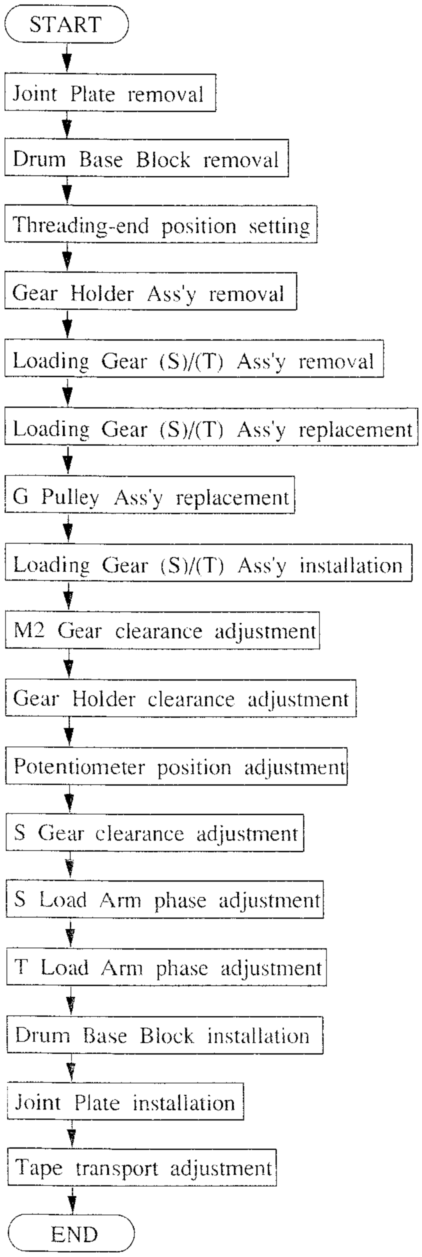
B. Prepare the following tools.
- RG Set Pin
Sony Parts No. : J-6254-650-A
- Molyton grease
Sony Parts No. : 7-662-001-41



(This illustration is DVR-28)

Fig. 6-20-1 Loading Gear Ass'y

C. Replacement flowchart


START
Joint Plate removal
Drum Base Block removal
Threading-end position setting
Gear Holder Ass'y removal
Loading Gear (S)/(T) Ass'y removal
Loading Gear (S)/(T) Ass'y replacement
G Pulley Ass'y replacement
Loading Gear (S)/(T) Ass'y installation
M2 Gear clearance adjustment
Gear Holder clearance adjustment
Potentiometer position adjustment
S Gear clearance adjustment
S Load Arm phase adjustment
T Load Arm phase adjustment
Drum Base Block installation
Joint Plate installation
Tape transport adjustment
END

Removal

1. Joint Plate removal (Fig. 6-20-2)
   (1) Remove two screws fixing the Joint Plate, then remove the Joint Plate.
   (2) Press the lever shown in the figure in the direction indicated by the arrow, then lift the USE Ass'y in the direction indicated by the arrow.

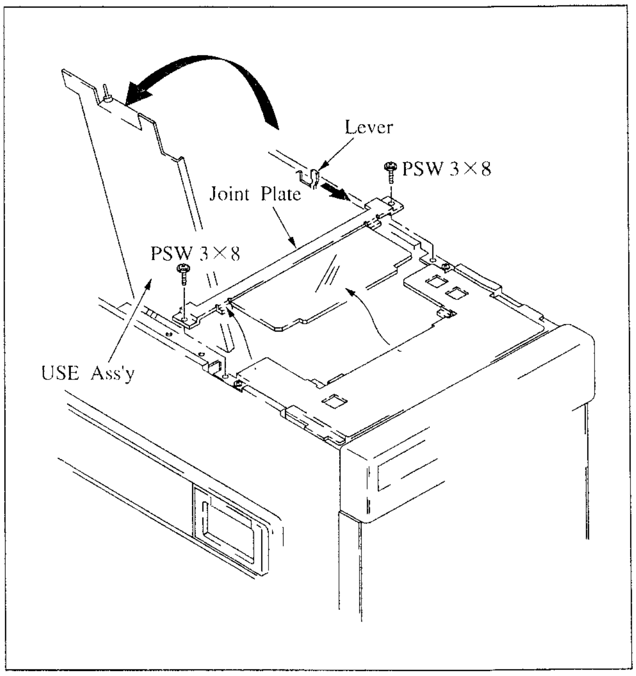

Lever
PSW 3×8
Joint Plate
PSW 3×8
USE Ass'y

Fig. 6-20-2 Joint Plate Removal

2. Drum Base Block removal
   Refer to Section 6-17-1.

3. Threading-end position setting (Fig. 6-20-3)
   (1) By hand, turn the Worm Gear portion of the Loading Motor shown in the figure in the direction indicated by arrow A, then set the S/T Arm Ass'y to the threading-end.
   At this time, confirm that the longitudinal holes of the Loading Gears (S) and (T) shown in the figure are aligned with the round holes of the Base Plate when they are viewed from above.
   (2) Insert the RG Set Pin to the hole and fix the Loading Gear.

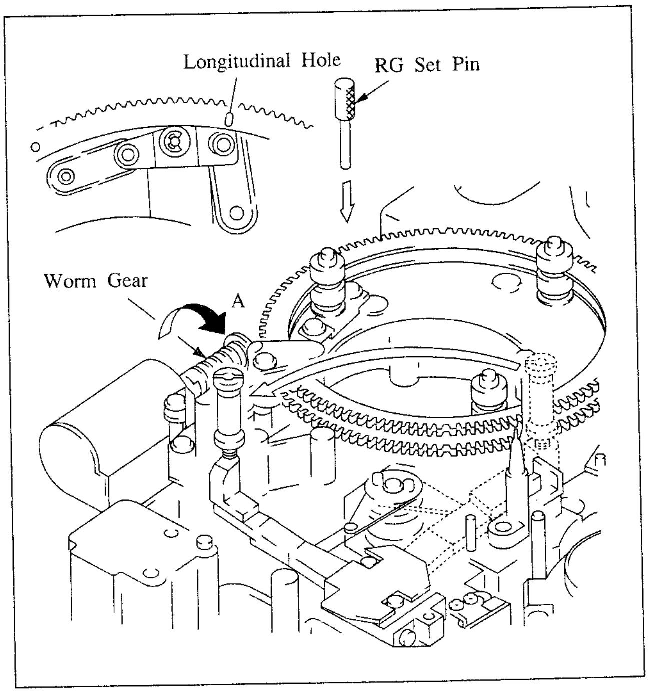


Fig. 6-20-3 Threading-end Position Setting

4. Gear Holder Ass'y removal (Fig. 6-20-4)
   - Remove the two screws that lock the Gear Holder Ass'y and dismount the Gear Holder Ass'y.

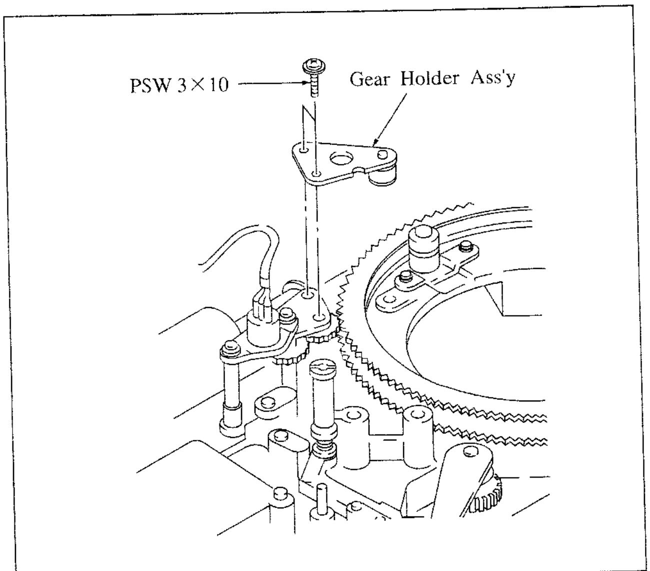


Fig. 6-20-4 Gear Holder Ass'y Removal

5. Loading Gear (S)/(T) Ass'y removal
   (1) Remove the three E rings which lock the G Pulley Ass'y shown in the figure. (Fig. 6-20-5)

       Note : Do not loosen the screw which locks the G Pulley Ass'y shown in Fig. 6-20-5.

   (2) Remove the RG Set Pin. Do not rotate the Main Shaft and Loading Motor until step 7.

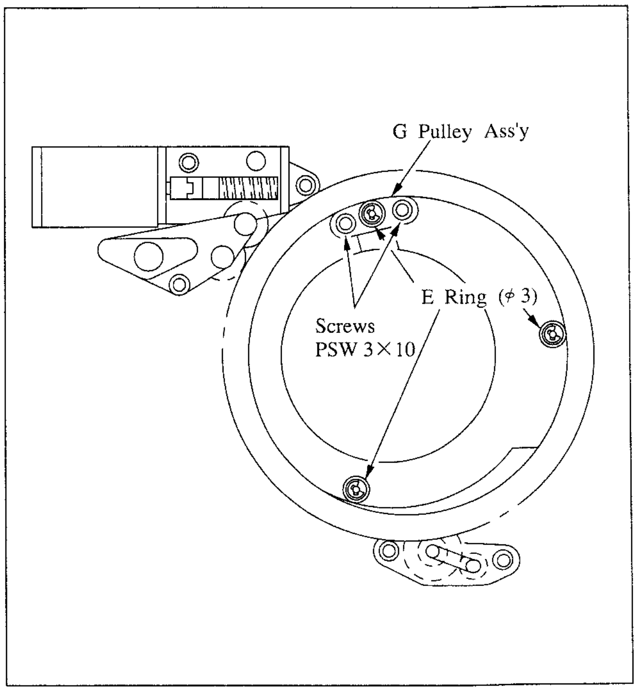

G Pulley Ass'y
E Ring (ϕ 3)
Screws
PSW 3×10

Fig. 6-20-5 Loading Gear (S)/(T) Ass'y Removal (1)

   (3) Dismount the Loading Gear (S)/(T) Ass'y and the G Pulley Ass'y conpoments. (Fig. 6-20-6)

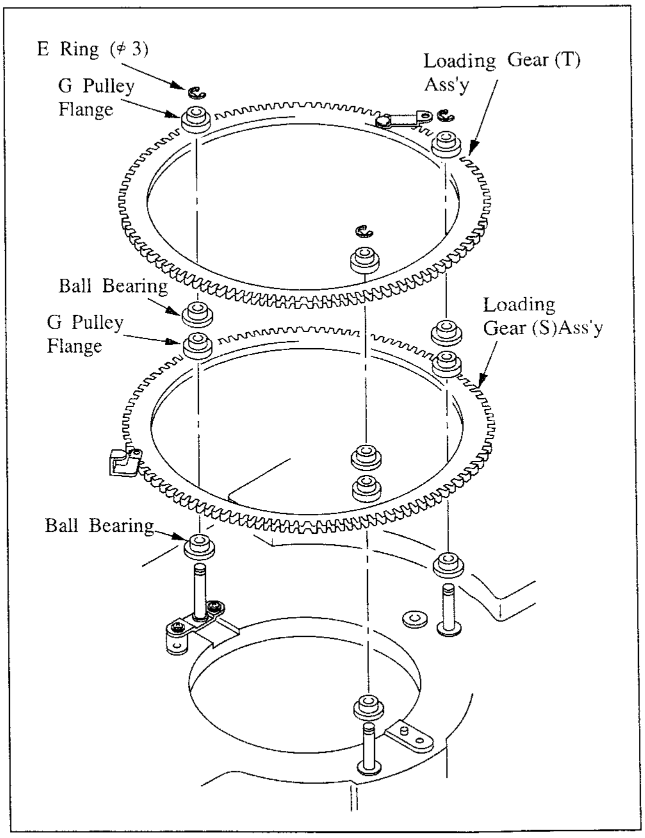

E Ring (ϕ 3)
G Pulley Flange
Loading Gear (T) Ass'y
Ball Bearing
G Pulley Flange
Loading Gear (S)Ass'y
Ball Bearing

Fig. 6-20-6 Loading Gear (S)/(T) Ass'y Removal (2)

Replacement

6. Loading Gear (S)/(T) Ass'y replacement (Fig. 6-20-7)
   (1) Loading Gear (S)/(T) Ass'y can be disassembled as shown in the figure.
   (2) Replace the necessary components.
   (3) After replacement, smear a small amount of Molyton grease to the Link Arm indicated in the figure.

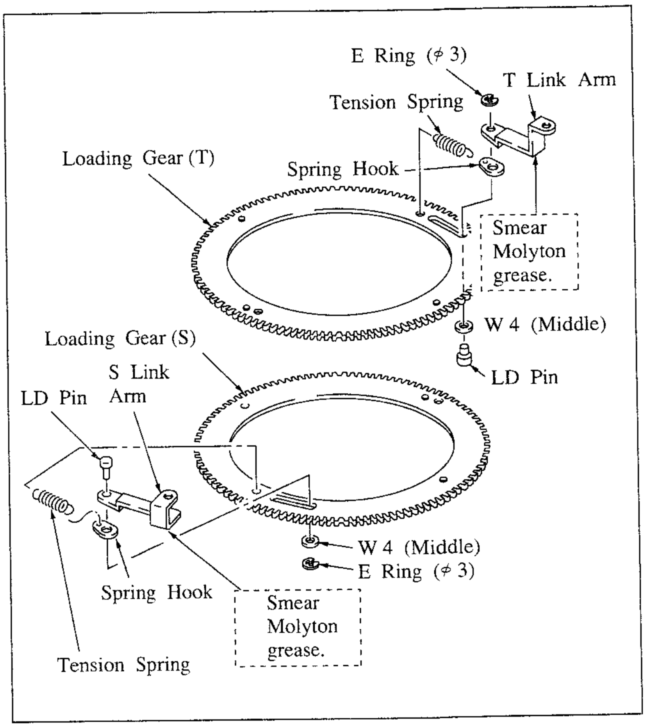

E Ring (ϕ 3)
T Link Arm
Tension Spring
Loading Gear (T)
Spring Hook
Smear Molyton grease.
W 4 (Middle)
LD Pin
Loading Gear (S)
S Link Arm
LD Pin
W 4 (Middle)
E Ring (ϕ 3)
Spring Hook
Smear Molyton grease.
Tension Spring

Fig. 6-20-7 Loading Gear (S)/(T) Ass'y Replacement

7. G Pulley Ass'y replacement (Fig. 6-20-8)
   (1) The G Pulley Ass'y can be disassembled as shown in the figure.
   (2) Replace the necessary components.
   When replacing components, clean the shaft portion with cloth moistened with cleaning liquid, then smear a small amount of Molyton grease to the surface of the shaft.

   Note 1 : Neither loosen, nor remove the two screws which lock the G Pulley Base Ass'y unless necessary.

   Note 2 : Do not mount the components of the G Pulley Ass'y in this stage because they are to be mounted with the Loading Gear (S)/(T) Ass'y.

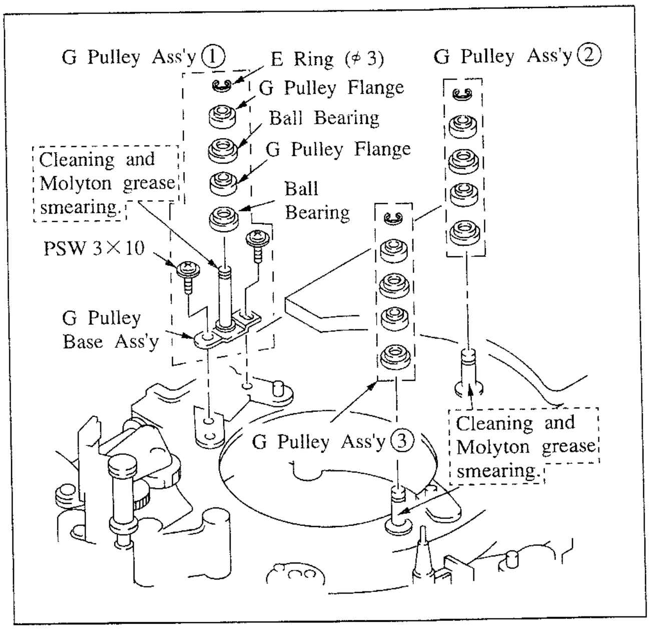

G Pulley Ass'y①
E Ring (ϕ 3)
G Pulley Ass'y②
G Pulley Flange
Ball Bearing
G Pulley Flange
Cleaning and Molyton grease smearing.
Ball Bearing
PSW 3×10
G Pulley Base Ass'y
G Pulley Ass'y③
Cleaning and Molyton grease smearing.

Fig. 6-20-8 G Pulley Ass'y Replacement

8. Loading Gear (S)/(T) Ass'y installation
   1. (1) Mount three ball bearings on the shaft of the G Pulley Ass'y.
   2. (2) Mount the Loading Gear (S) Ass'y.

      Note : Make sure that the round hole of the Base Plate and the longitudinal hole of the Loading Gear (S) Ass'y shown in the figure are matched when seen from the above.

   3. (3) Mount three G Pulley Flanges on the shaft of the G Pulley Ass'y.
   4. (4) Mount three ball bearings on the shaft of the G Pulley Ass'y.
   5. (5) Mount the Loading Gear (T) Ass'y.

      Note : Make sure that the longitudinal hole of the Loading Gear (S) Ass'y and the longitudinal hole of the Loading Gear (T) Ass'y shown in the figure are matched when seen from the above. After mounting the Loading Gear (T) Ass'y, insert the RG Set Pin into the longitudinal holes to make sure that it can be inserted securely.

   6. (6) Mount three G Pulley Flanges on the shaft of the G Pulley Ass'y.
   7. (7) Mount three E rings on the shaft of the G Pulley Ass'y.
   8. (8) Pull out the RG Set Pin.
   9. (9) Turn the Loading Motor with fingers and make sure that the Loading Gear (S)/(T) Ass'y rotate smoothly.

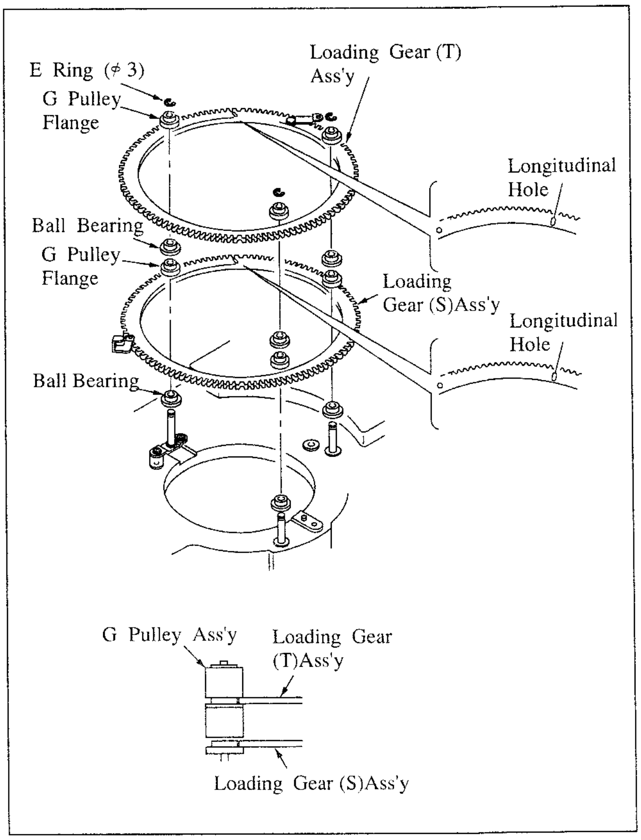

E Ring (ϕ 3)
G Pulley Flange
Loading Gear (T) Ass'y
Longitudinal Hole
Ball Bearing
G Pulley Flange
Loading Gear (S)Ass'y
Longitudinal Hole
Ball Bearing
G Pulley Ass'y
Loading Gear (T)Ass'y
Loading Gear (S)Ass'y

Fig. 6-20-9 Loading Gear (T) Ass'y Installation

9. M2 Gear clearance adjustment
   Refer to Section 6-17-2.

10. Gear Holder clearance adjustment
    Refer to Section 6-17-2.

11. Potentiometer position adjustment
    Refer to Section 6-17-3.

12. S Gear clearance adjustment
    Refer to Section 6-18.

13. S Load Arm phase adjustment
    Refer to Section 6-19.

14. T Load Arm phase adjustment
    Refer to Section 6-19.

15. Drum Base Block installation
    Refer to Section 6-17-1.

16. Joint Plate installation
    Reverse the procedure in Step 1.

17. Tape transport adjustment
    Refer to Section 9.

6-21. S LOAD ARM ASS'Y REPLACEMENT

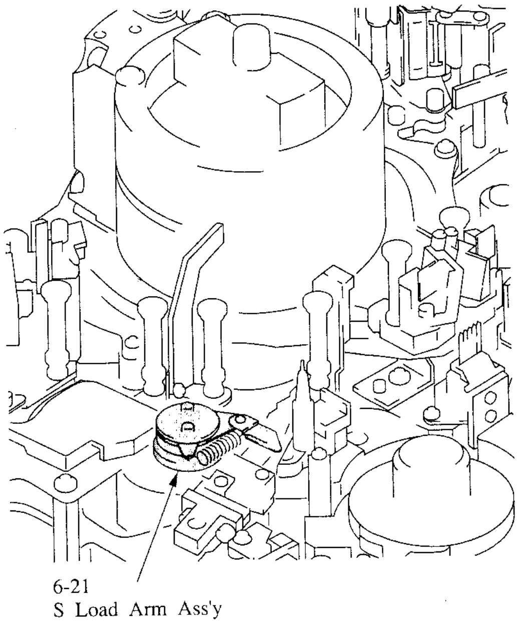
Basic Knowledge

A. Fig. 6-21-1 shows the S Load Arm Ass'y block. To replace parts of this block, remove the following blocks.
- Cassette compartment Joint plate
- S Guide Base Ass'y
- Cleaning Roller Ass'y

B. Prepare the following tools.
- RG Set Pin
  Sony Parts No. : J-6254-650-A
- Molyton grease
  Sony Parts No. : 7-662-001-41

C. Replacement flowchart

START
↓
Joint Plate removal
↓
S Guide Base Ass'y removal
↓
Cleaning Roller Ass'y removal
↓
Threading-end position setting
↓
S Load Arm Ass'y removal
↓
Components replacement
↓
S Load Arm Ass'y installation
↓
Main Shaft Worm Gear (S)/(T) clearance adjustment
↓
S Load Arm phase adjustment
↓
Molyton grease smearing on the Worm Gear
↓
T Drawer Arm press position check/adjustment
↓
Cleaning Roller Ass'y installation
↓
Unthreading-end position setting
↓
S Guide Base Ass'y installation
↓
Joint Plate installation
↓
Tape transport adjustment
↓
END



(This illustration is DVR-28)

Fig. 6-21-1 S Load Arm Ass'y

Removal

1. Joint Plate removal (Fig. 6-21-2)
   (1) Remove the two screws fixing the Joint Plate, then remove the Joint Plate.
   (2) Press the lever shown in the figure in the direction indicated by the arrow, then lift the USE Ass'y in the direction indicated by the arrow.

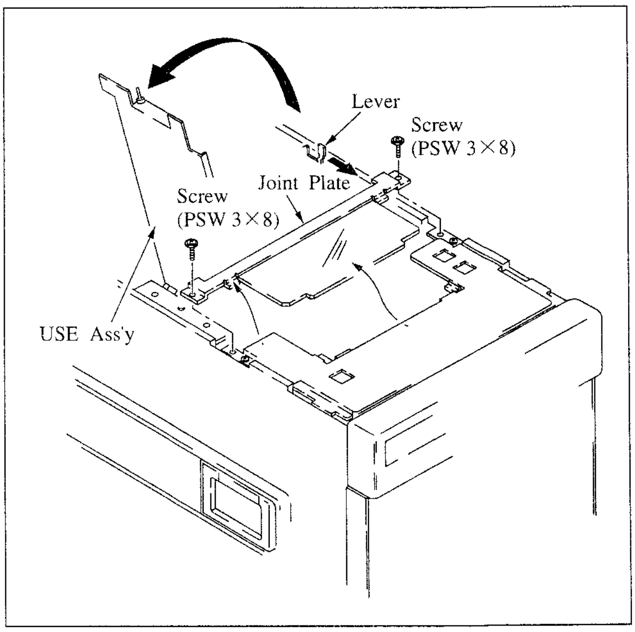

Lever
Screw
(PSW 3×8)
Joint Plate
Screw
(PSW 3×8)
USE Ass'y

Fig. 6-21-2 Joint Plate Removal

2. S Guide Base Ass'y removal (Fig. 6-21-3)
   (1) Remove the screw fixing the Tape Protector, then remove the Tape Protector.
   (2) Remove the connector that is connected to the PC-63 Board.
   (3) Remove the two screws fixing the S Guide Base Ass'y and remove the S Guide Base Ass'y.

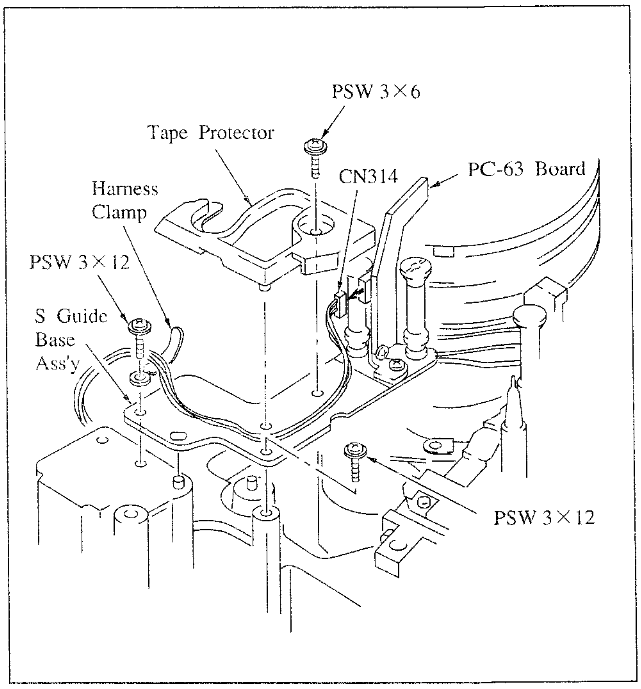

PSW 3×6
Tape Protector
CN314
PC-63 Board
Harness Clamp
PSW 3×12
S Guide Base Ass'y
PSW 3×12

Fig. 6-21-3 S Guide Base Ass'y Removal

3. Cleaning Roller Ass'y removal
   Refer to Section 6-4.

4. Threading-end position setting (Fig. 6-21-4)
   (1) By hand, turn the Worm Gear portion of the Loading Motor shown in the figure in the direction indicated by arrow A, then set the S/T Arm Ass'y to the threading-end.
   At this time, confirm that the longitudinal holes of the Loading Gears (S) and (T) are aligned with the round holes of the Base Plate when they are viewed from above.
   (2) Insert the RG Set Pin to the longitudinal hole of the Loading Gear, then fix the Loading Gear.

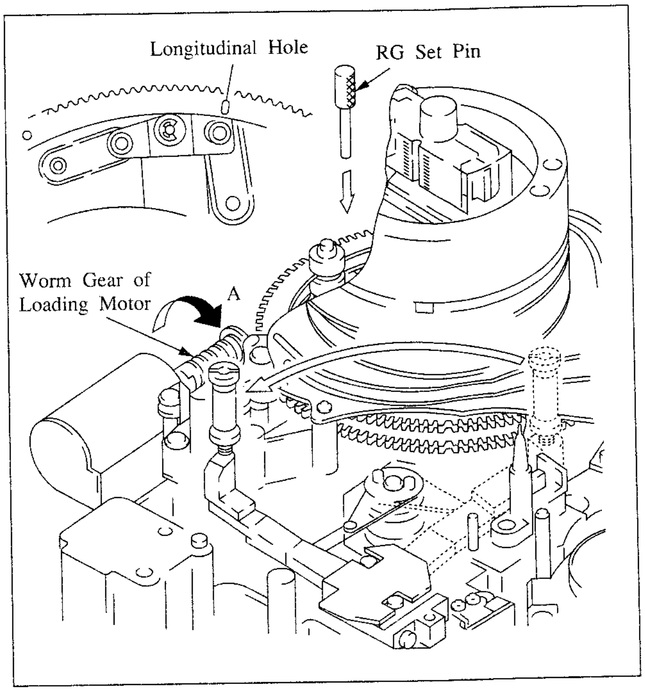


Fig. 6-21-4 Threading-end Position Setting

5. S Load Arm Ass'y removal
   (1) Remove the E ring shown in Fig. 6-21-5.

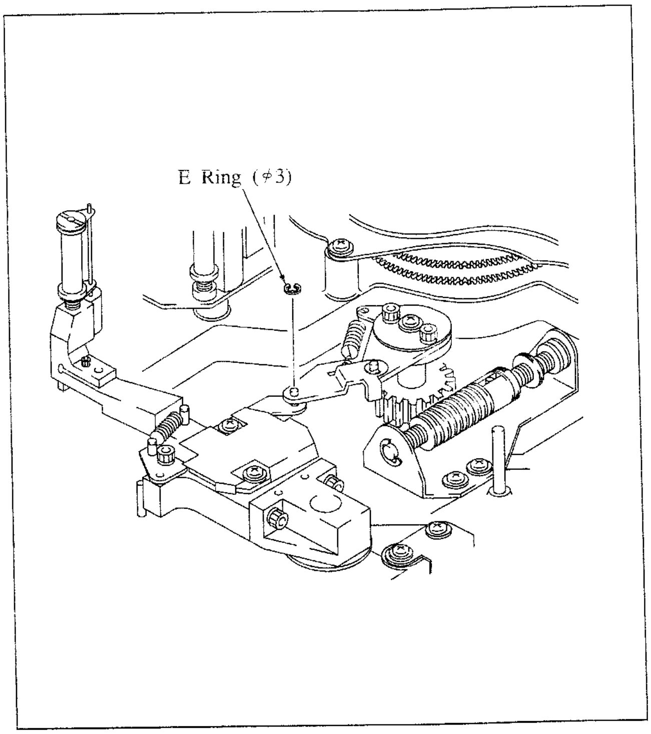


Fig. 6-21-5 S Load Arm Ass'y Removal

(2) Remove the fixing screws shown in Fig. 6-21-6 and remove the S Load Arm Ass'y.

Replacement

6. Components replacment (Fig. 6-21-6)
   (1) Replace necessary components.

   Note : The spring shown in the figure should be replaced with a new part when removing the spring.

   (2) When replacing components, temporarily fix the two adjusting screws.

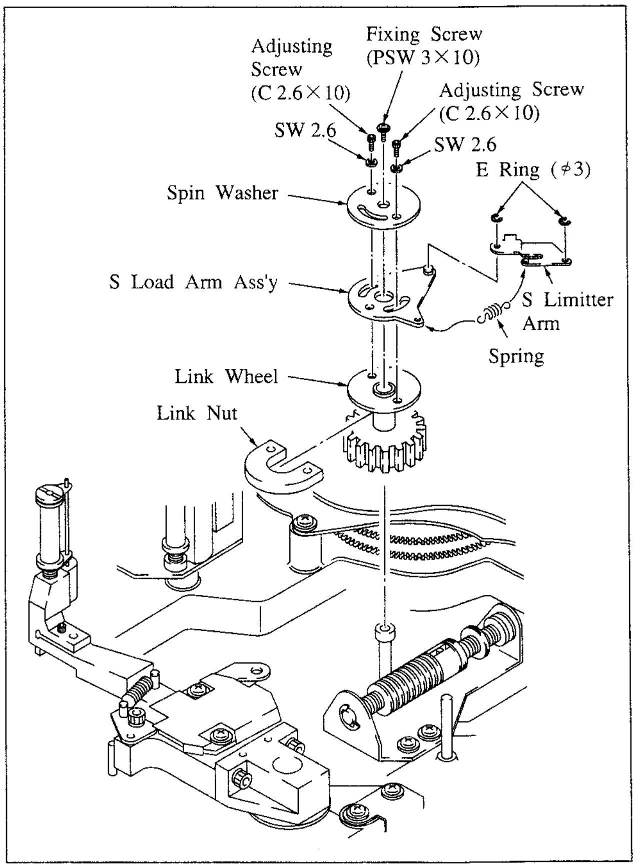

Adjusting Screw (C 2.6×10)
Fixing Screw (PSW 3×10)
Adjusting Screw (C 2.6×10)
SW 2.6
SW 2.6
E Ring (φ3)
Spin Washer
S Load Arm Ass'y
S Limitter Arm
Spring
Link Wheel
Link Nut

Fig. 6-21-6 S Load Arm Ass'y Replacement

Installation/Adjustment

7. S Load Arm Ass'y installation (Fig. 6-21-7)
   (1) Clean the peripheral and inner surfaces of the S Load Arm Shaft shown in the figure.
   (2) Smear a small amount of Molyton grease over the side of the S Load Arm Shaft.
   (3) Press the S Tension Regulator Ass'y in the direction indicated by arrow A.
   (4) Move the S Load Link so that the D side of the S Load Link is parallel against the Main Shaft using a finger.
   (5) As keeping the status in step (4), install the S Load Arm Ass'y by fitting shaft B of the S Load Link into hole C of the S Load Arm Ass'y.
   (6) Secure the S Load Arm Ass'y with a fixing screw.
   (7) Fit the E ring to shaft B.

8. Main Shaft Worm Gear (S)/(T) clearance adjustment
   Refer to Section 6-19.
   Confirm only the Main Shaft Worm Gear (S) clearance adjustment. Do not loosen the fixing screws of the Main Shaft Ass'y when confirming the Main Shaft Worm Gear. If the screws are out of the standard, loosen them.
   If the screws are loosened, be sure to adjust clearance of Main Shaft Worm Gear (S)/(T).

9. S Load Arm phase adjustment
   Refer to Section 6-19.

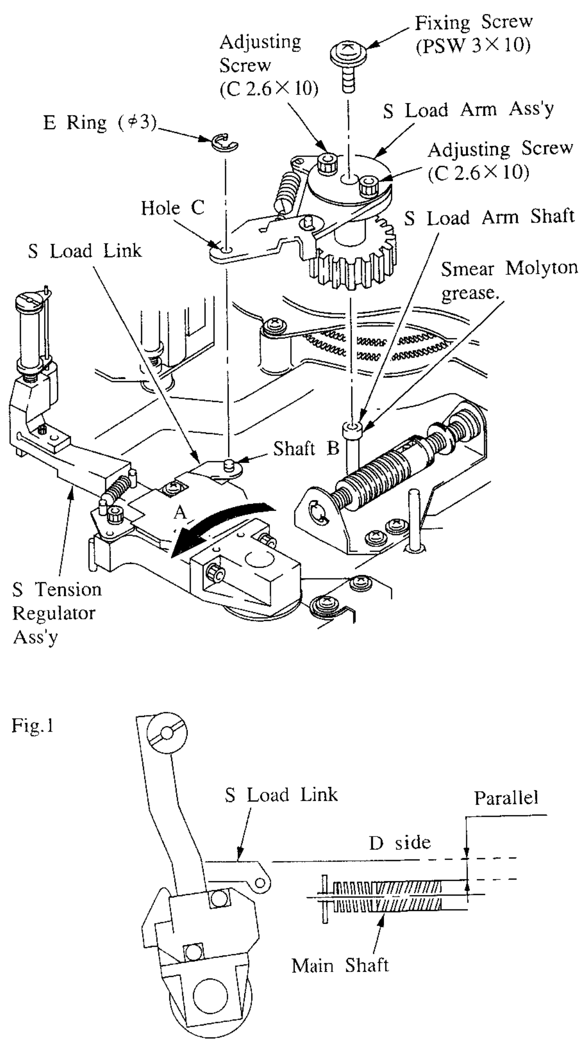

Fixing Screw
(PSW 3×10)
Adjusting
Screw
(C 2.6×10)
S Load Arm Ass'y
E Ring (φ3)
Adjusting Screw
(C 2.6×10)
Hole C
S Load Arm Shaft
S Load Link
Smear Molyton
grease.
Shaft B
A
S Tension
Regulator
Ass'y
Fig.1
S Load Link
Parallel
D side
Main Shaft

Fig. 6-21-7 S Load Arm Ass'y Installation

10. Molyton grease smearing (Fig. 6-21-8)
    - Smear a small amount of Molyton grease to the contacting portions (shown in the figure) between the Worm Gear S and the Worm Wheel.
      Also Smear a small amount of Molyton grease over the joint section of the S Load Arm Ass'y and the S Load Link.

11. T Drawer Arm press position check/adjustment
    Refer to Section 6-26-1.
    Be sure to pull out the RG Set Pin mounted in step (3).

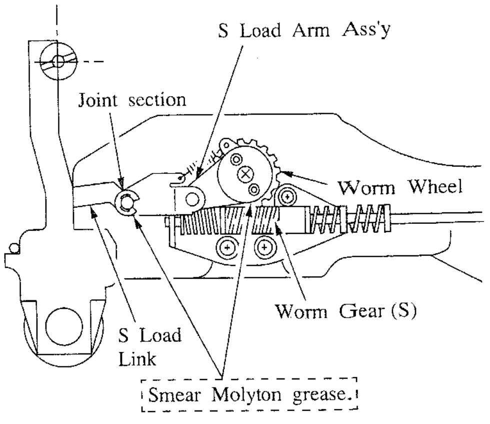

S Load Arm Ass'y
Joint section
Worm Wheel
Worm Gear (S)
S Load
Link
Smear Molyton grease.

Fig. 6-21-8 Molyton Grease Smearing

12. Cleaning Roller Ass'y installation
    Refer to Section 6-4.

13. Unthreading-end position setting (Fig. 6-21-9)
    - Turn the Worm Gear portion of the Loading Motor (shown in the figure) in the direction indicated by arrow B and set it to the unthreading-end.

14. S Guide Base Ass'y installation
    Install the S Guide Base Ass'y in the reverse order of step 2.

15. Joint Plate installation
    Install the Joint Plate in the reverse order of step 1.

16. Tape transport adjustment
    Refer to Section 9.

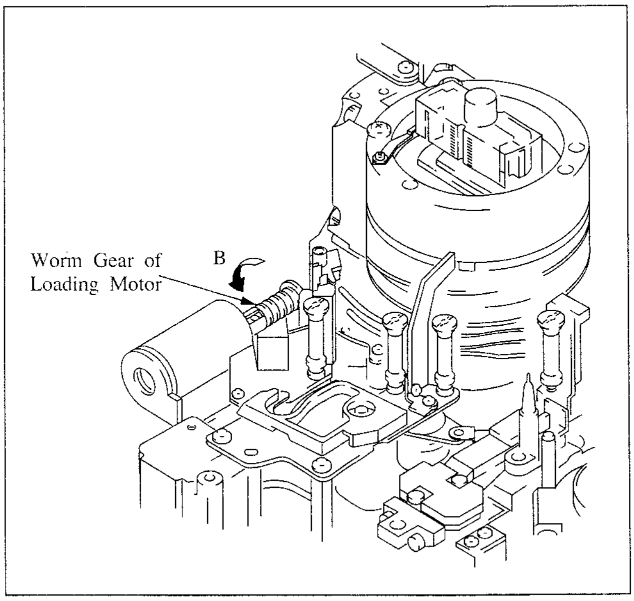


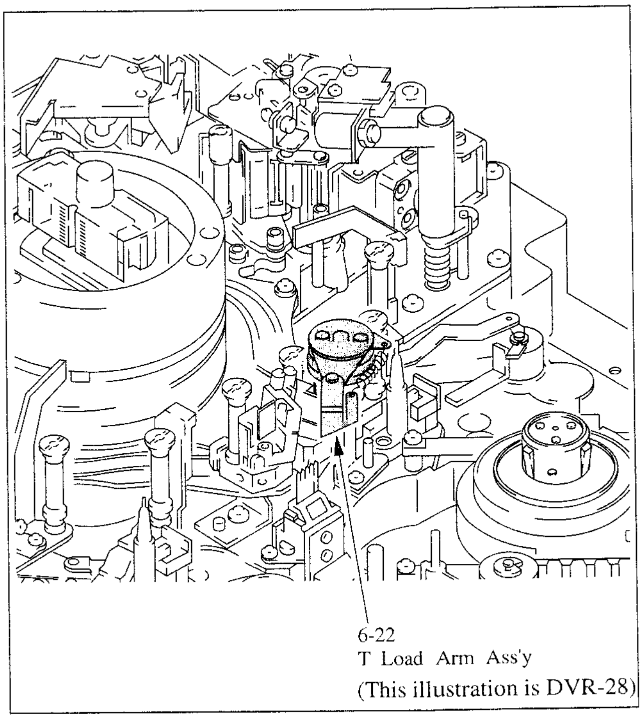
Fig. 6-21-9 Unthreading-end Position Setting

6-22. T LOAD ARM ASS'Y REPLACEMENT

Basic Knowledge

A. Fig. 6-22-1 shows the T Load Arm Ass'y block. To replace parts of this block, remove the following blocks.
- Cassette Compartment Joint Plate
- Drum Base Block
- T Guide Base Ass'y

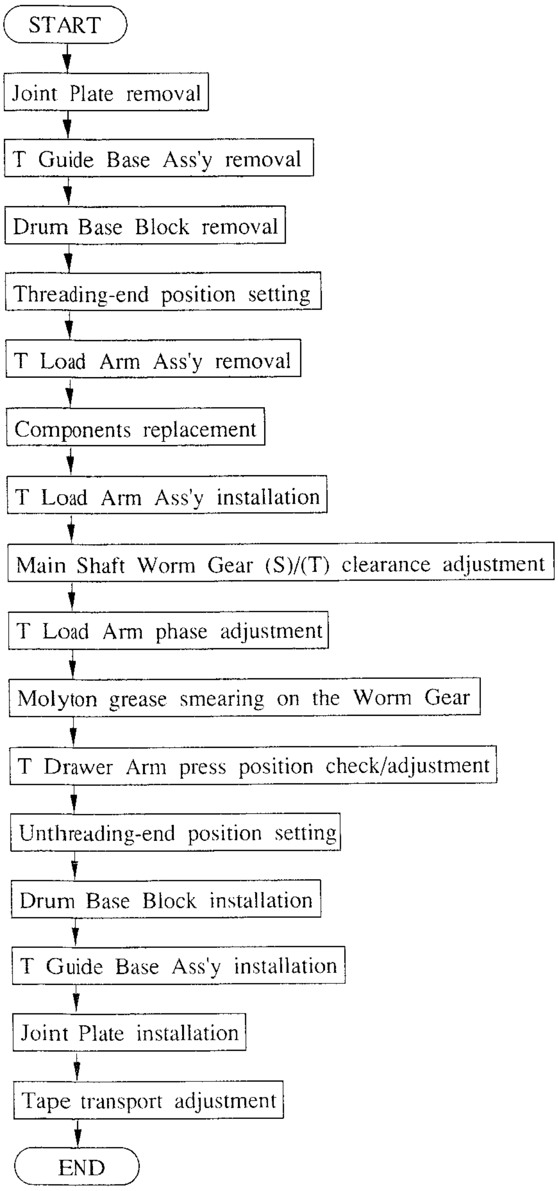
B. Prepare the following tools.
- RG Set Pin
  Sony Parts No. : J-6254-650-A
- Molyton grease
  Sony Parts No. : 7-662-001-41



(This illustration is DVR-28)

Fig. 6-22-1 T Load Arm Ass'y

C. Replacement flowchart


START
Joint Plate removal
T Guide Base Ass'y removal
Drum Base Block removal
Threading-end position setting
T Load Arm Ass'y removal
Components replacement
T Load Arm Ass'y installation
Main Shaft Worm Gear (S)/(T) clearance adjustment
T Load Arm phase adjustment
Molyton grease smearing on the Worm Gear
T Drawer Arm press position check/adjustment
Unthreading-end position setting
Drum Base Block installation
T Guide Base Ass'y installation
Joint Plate installation
Tape transport adjustment
END

Removal

1. Joint Plate removal (Fig. 6-22-2)
   (1) Remove the two screws fixing the Joint Plate and remove the Joint Plate.
   (2) Press the lever shown in the figure in the direction indicated by the arrow, then lift the USE Ass'y in the direction indicated by the arrow.

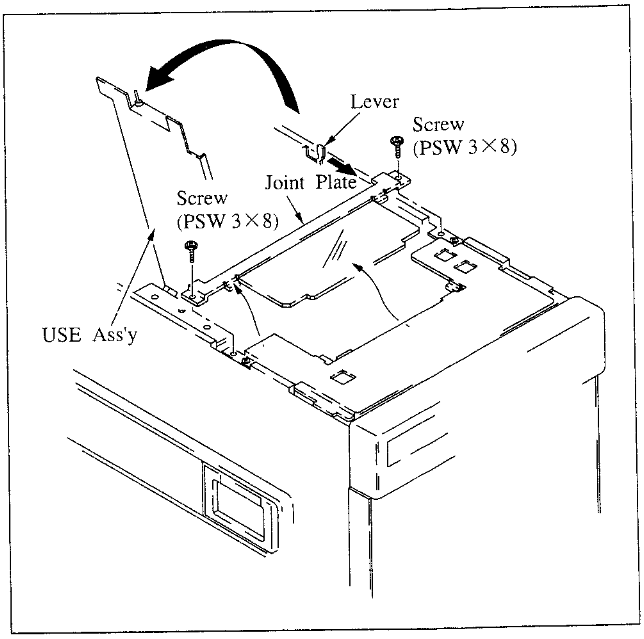

Lever
Screw
(PSW 3×8)
Joint Plate
Screw
(PSW 3×8)
USE Ass'y

Fig. 6-22-2 Joint Plate Removal

2. T Guide Base Ass'y removal (Fig. 6-22-3)
   (1) Disconnect the connector from each board, then remove each harness from the clamp.
   (2) Remove the hook of the spring shown in the figure.
   (3) Remove the two screws fixing the T Guide Base Ass'y, then remove the T Guide Base Ass'y in the direction indicated by the arrow.

   Note : When remove the spring, not change its figure.

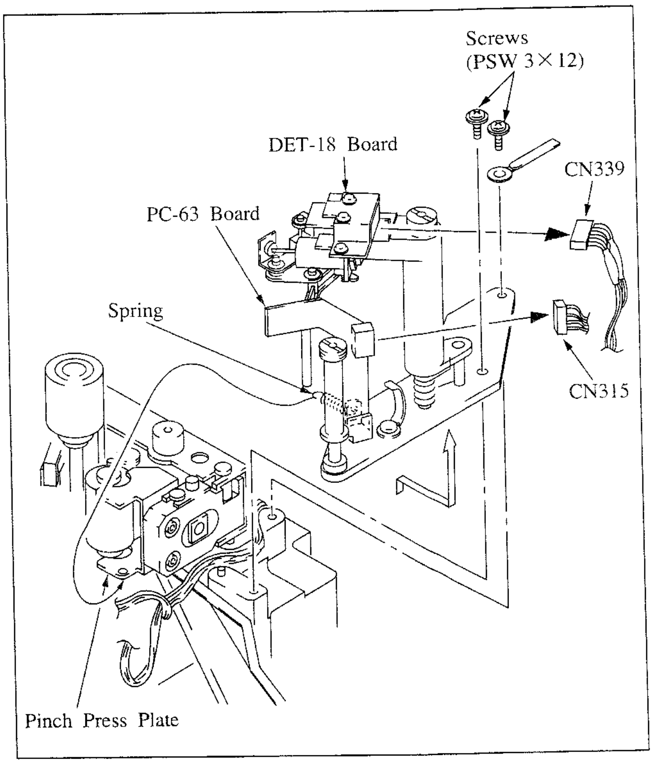

Screws
(PSW 3×12)
DET-18 Board
CN339
PC-63 Board
Spring
CN315
Pinch Press Plate

Fig. 6-22-3 T Guide Base Ass'y Removal

3. Drum Base Block removal
   Refer to Section 6-17-1.

4. Threading-end position setting
   (1) By hand, turn the Worm Gear portion of the Loading Motor shown in the figure in the direction indicated by arrow A, then set the S/T Arm Ass'y to the threading-end.
   At this time, confirm that the longitudinal holes of the Loading Gears (S) and (T) are aligned with the round holes of the Base Plate when they are viewed from above.
   (2) Insert the RG Set Pin to the hole, then fix the Loading Gear.

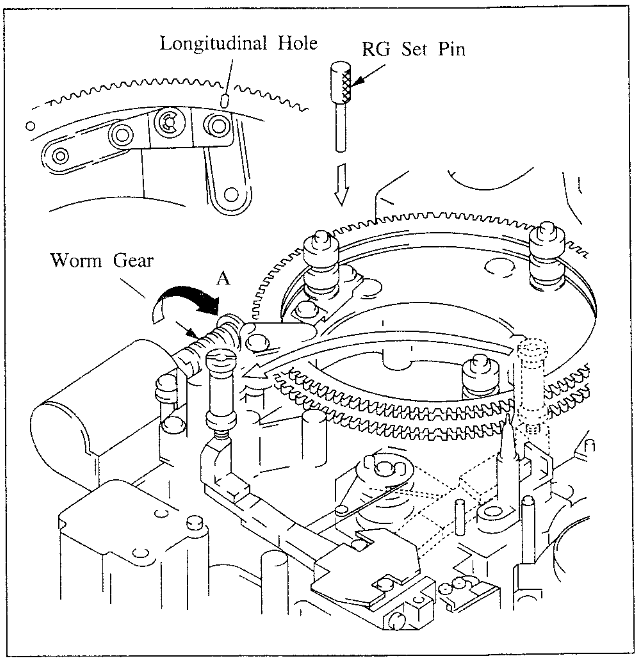


Fig. 6-22-4 Threading-end Position Setting

5. T Load Arm Ass'y removal
   (1) Remove the E ring shown in the figure, then remove the T Load Link Shaft.

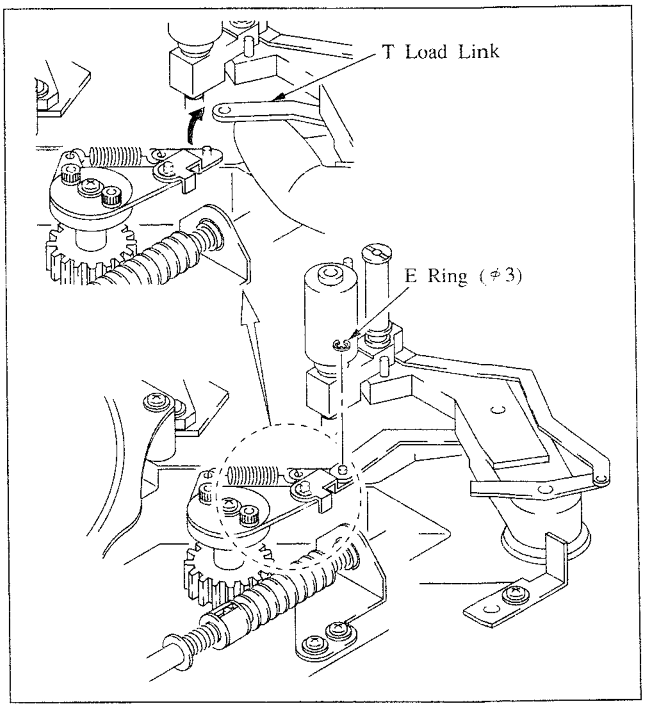


Fig. 6-22-5 T Load Arm Ass'y Removal

(2) Remove the fixing screw shown in Fig. 6-22-6 and remove the T Load Arm Ass'y.

Replacement

6. Components replacement (Fig. 6-22-6)
   (1) Replace necessary components.

   Note : The spring shown in the figure should be replaced with a new part when removing the spring.

   (2) When replacing components, temporarily fix the two adjusting screws.

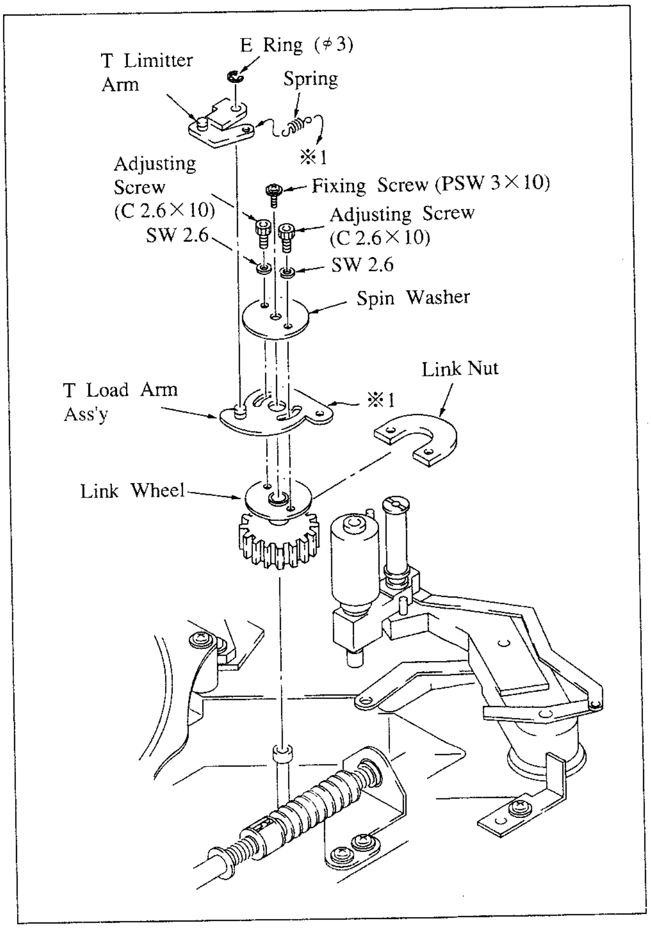

T Limitter Arm
E Ring (φ3)
Spring
※1
Adjusting Screw (C 2.6×10)
SW 2.6
Fixing Screw (PSW 3×10)
Adjusting Screw (C 2.6×10)
SW 2.6
Spin Washer
Link Nut
T Load Arm Ass'y
※1
Link Wheel

Fig. 6-22-6 T Load Arm Ass'y Replacement

Installation/Adjustment

7. T Load Arm Ass'y installation (Fig. 6-22-7)
   (1) Clean the peripheral and inner surfaces of the T Load Arm Shaft shown in the figure.
   (2) Smear a small amount of Molyton grease over the side of the T Load Arm Shaft.
   (3) Install the T Load Arm Ass'y by setting it so that E side of the T Load Arm Ass'y shown in Fig. 1 is seen in parallel with F side of the Base Plate. Tighten the fixing screw.
   (4) Mount the T Load Link to the T Load Arm Ass'y, then secure it with the E ring.

8. Main Shaft Worm Gear (S)/(T) clearance adjustment
   Refer to Section 6-19.
   Confirm only the Main Shaft Worm Gear (T) clearance adjustment. Do not loosen the fixing screws of the Main Shaft Ass'y when confirming the Main Shaft Worm Gear. If the screws are out of the standard, loosen them.
   If the screws are loosened, be sure to adjust clearance of the Main Shaft Worm Gear (S)/(T).

9. T Load Arm phase adjustment
   Refer to Section 6-19.

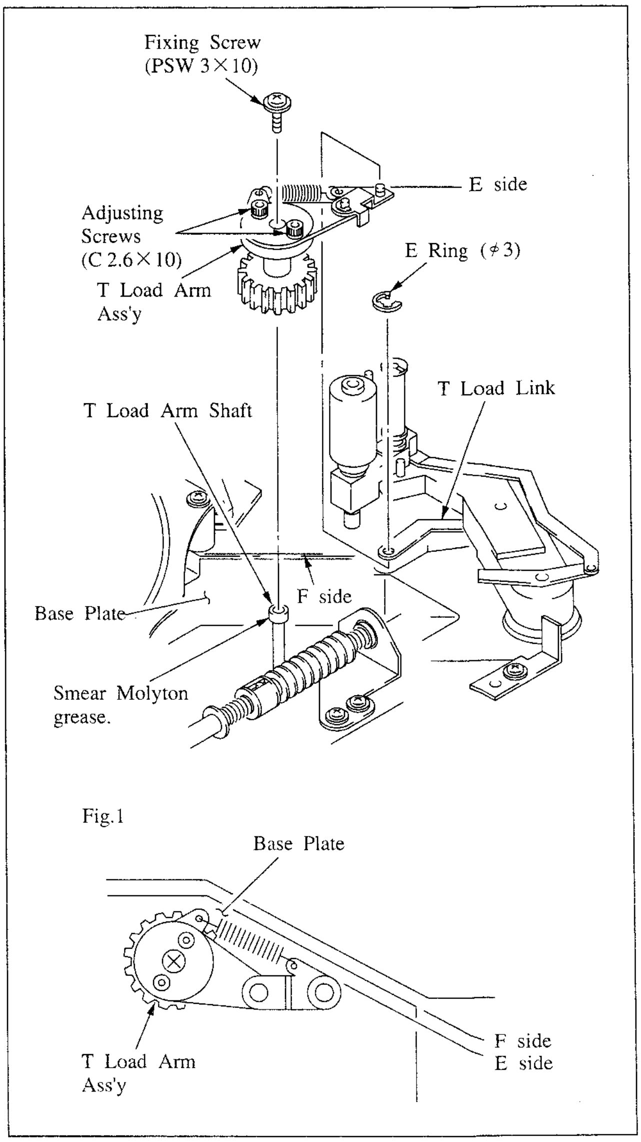

Fixing Screw
(PSW 3×10)
E side
Adjusting
Screws
(C 2.6×10)
E Ring (ϕ3)
T Load Arm
Ass'y
T Load Link
T Load Arm Shaft
F side
Base Plate
Smear Molyton
grease.
Fig.1
Base Plate
T Load Arm
Ass'y
F side
E side

Fig. 6-22-7 T Load Arm Ass'y Installation

10. Molyton grease smearing on the Worm Gear (Fig. 6-22-8)
    - Smear a small amount of Molyton grease to the contacting portions (shown in the figure) between the Worm Gear T and the Worm Wheel.
      Also smear a small amount of Molyton grease over the joint section of the T Load Arm Ass'y and the T Load Link.

11. T Drawer Arm press position check/adjustment
    Refer to Section 6-26-1.
    Be sure to pull out the RG Set Pin mounted in step 4.

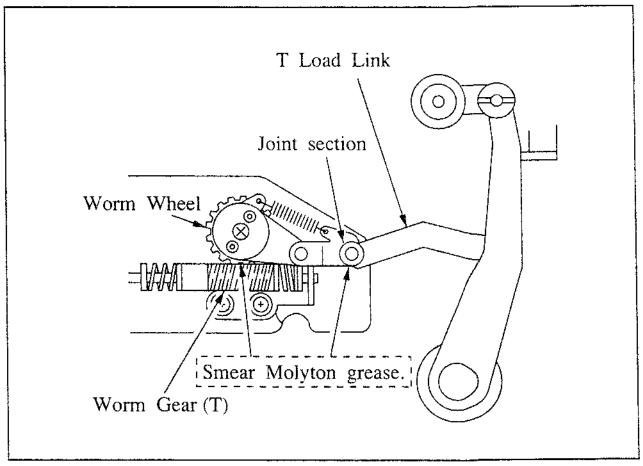

T Load Link
Joint section
Worm Wheel
Smear Molyton grease.
Worm Gear (T)

Fig. 6-22-8 Molyton Grease Smearing on the Worm Gear

12. Unthreading-end position setting (Fig. 6-22-9)
    - Turn the Worm Gear portion of the Loading Motor (shown in the figure) in the direction indicated by arrow B and set it to the unthreading-end.

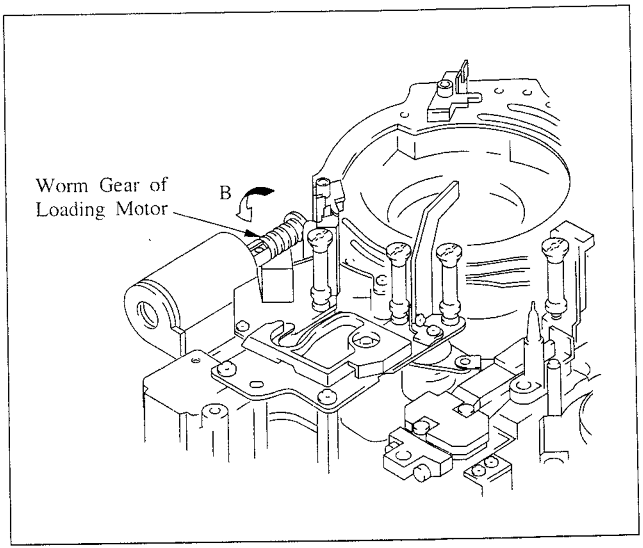


Fig. 6-22-9 Unthreading-end Position Setting

13. Drum Base Block installation
    Refer to Section 6-17-1.

14. T Guide Base Ass'y installation
    Install the T Guide Base Ass'y in the reverse order of step 2.

15. Joint Plate installation
    Install the Joint Plate in the reverse order of step 1.

16. Tape transport adjustment
    Refer to Section 9.

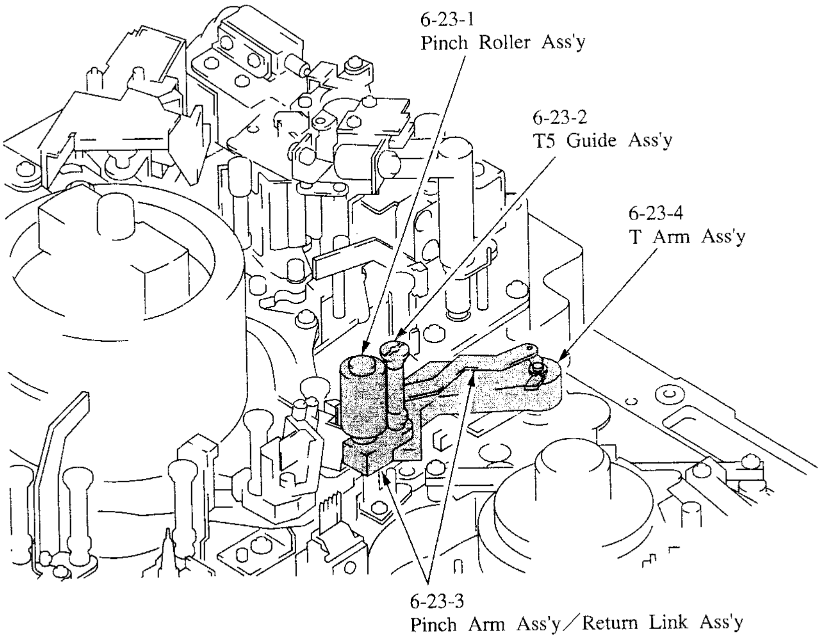
6-23. T DRAWER ARM ASS'Y REPLACEMENT

A. Figure 6-23-1 shows the T Drawer Arm Ass'y block.
The replacement procedure of the T Drawer Arm Ass'y is described as follows:
6-23-1. Pinch Roller Ass'y Replacement
6-23-2. T5 Guide Ass'y Replacement
6-23-3. Pinch Arm Ass'y and Return Link Ass'y Replacement
6-23-4. T Arm Ass'y Replacement

B. Some parts of the T5 Guide Ass'y was changed on the following sets. But the replacement procedures and adjustment procedures were all the same.

DVR-28 (UC)	: S/N 12501 and higher
DVR-28P (UC)	: S/N 11903 and higher
DVR-28P (EK)	: S/N 12001 and higher
DVR-P28 (UC)	: S/N 10401 and higher

C. Prepare the following tools.
- Thickness gauge
  Sony Parts No.: J-6041-670-A
- Confidence Head Adjustment Plate
  Sony Parts No.: J-6257-140-A
- Reel Table Height Adjustment Tool
  Sony Parts No.: J-6252-190-B
- Reference Plate (28) : DM-739
  Sony Parts No.: J-6257-390-A
- Molyton grease (No. 320)
  Sony Parts No.: 7-662-001-41



(This illustration is DVR-28)

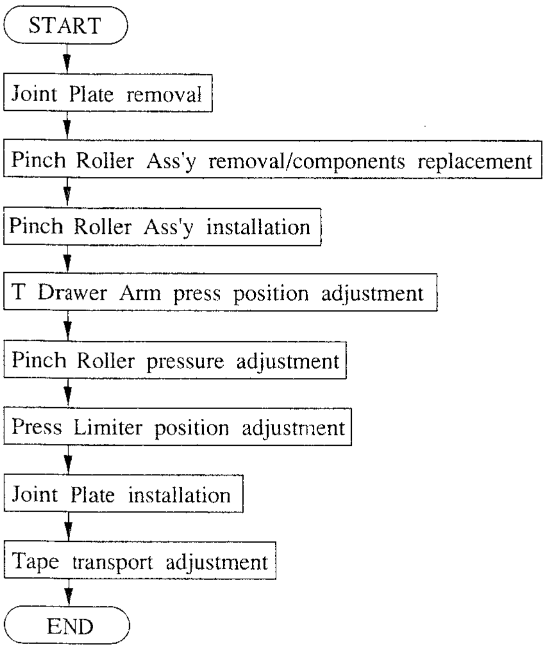
Fig. 6-23-1 T Drawer Arm Ass'y

6-23-1. Pinch Roller Ass'y Replacement

Basic knowledge

A. Remove the Joint Plate before replacing the Pinch Roller Ass'y.

B. Replacement flowchart


START
Joint Plate removal
Pinch Roller Ass'y removal/components replacement
Pinch Roller Ass'y installation
T Drawer Arm press position adjustment
Pinch Roller pressure adjustment
Press Limiter position adjustment
Joint Plate installation
Tape transport adjustment
END

Removal

1. Joint Plate removal (Fig. 6-23-2)
   (1) Remove the two screws that fix the Joint Plate and remove the Joint Plate.
   (2) Press the lever shown in the figure in the direction indicated by the arrow, then lift up the USE Ass'y in the direction indicated by the arrow.

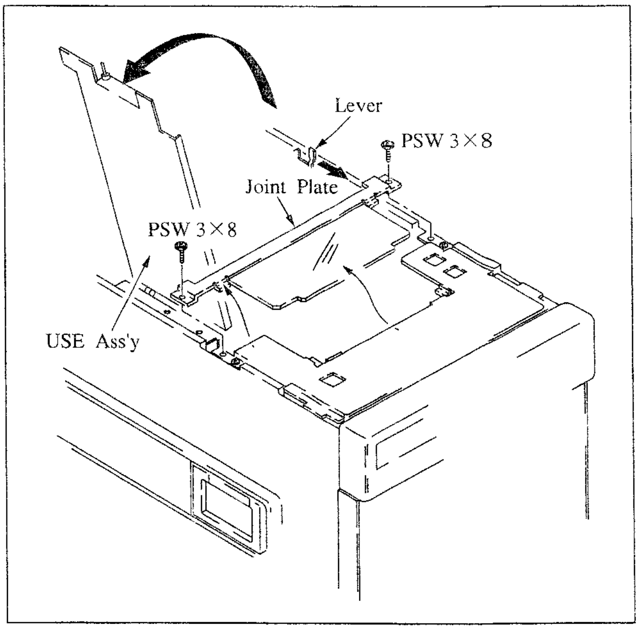

Lever
PSW 3×8
Joint Plate
PSW 3×8
USE Ass'y

Fig. 6-23-2 Joint Plate Removal

2. Pinch Roller Ass'y removal/components replacement (Fig. 6-23-3)
   (1) Remove the two Pinch Screws shown in the figure and remove the components of the Pinch Roller Ass'y.
   (2) Replace the necessary components.

   Note : When removing or loosening the Pinch Screws, hold the Pinch Arm Ass'y by hand.

Installation

3. Pinch Roller Ass'y installation
   (1) Wipe the shaft portion, Pinch Flanges (upper and lower), and Pinch Sleeve with a dry cloth.
   (2) Clean the inside of the bearings (upper and lower) of the Pinch Roller to be replaced with cloth moistened with cleaning liquid.
   (3) Pass the Pinch Flange (lower) through the shaft and fix the E ring.
   (4) Pass the other parts through the shaft, then tighten them using the Pinch Screws.

   Note : Note the direction to mount the Pinch Roller to the shaft.

Adjustment

4. Carry out the following adjustment:
   - T Drawer Arm press position adjustment
   - Pinch Roller pressure adjustment
   - Press Limiter position adjustment

   Refer to Section 6-26-1.

5. Joint Plate installation
   Install the Joint Plate in the reverse order of step 1.

6. Tape transport adjustment
   Refer to Section 9.

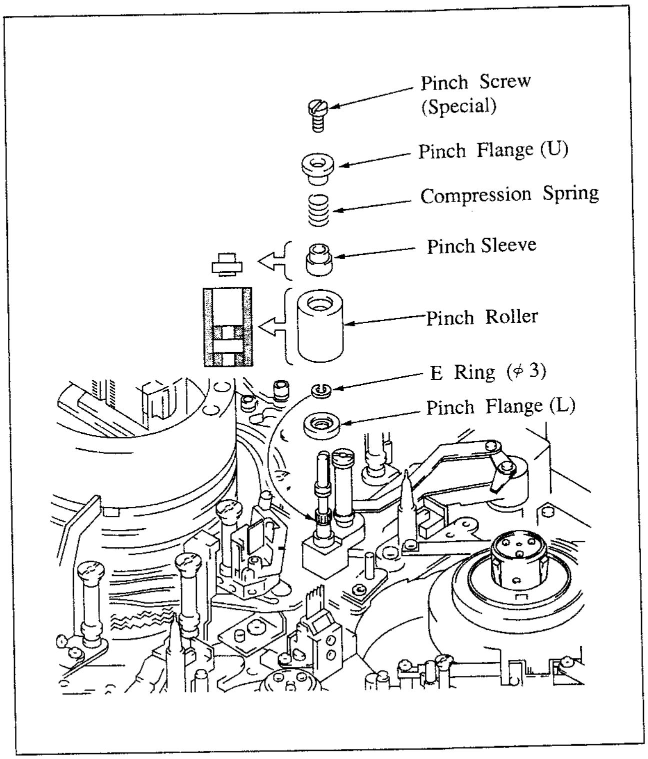


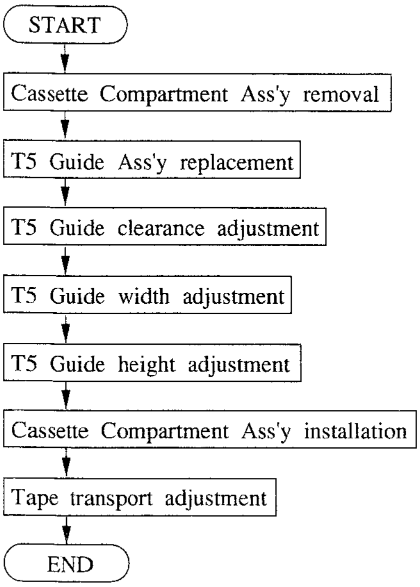
Fig. 6-23-3 Pinch Roller Ass'y Replacement

6-23-2. T5 Guide Ass'y Replacement

Basic knowledge

A. Remove the Cassette Compartment Ass'y before replacing the T5 Guide Ass'y.

B. Replacement flowchart


START
Cassette Compartment Ass'y removal
T5 Guide Ass'y replacement
T5 Guide clearance adjustment
T5 Guide width adjustment
T5 Guide height adjustment
Cassette Compartment Ass'y installation
Tape transport adjustment
END

Removal

1. Cassette Compartment Ass'y removal
   Refer to Section 6-5.

Replacement

2. T5 Guide Ass'y replacement (Figure 6-23-4)
   (1) Turn the Flange Retainer shown in the figure counterclockwise and remove it so that the T5 Guide Ass'y can be disassembled as shown in the figure.

   Note : The parts with ※5 mark were changed on the following sets as shown in Fig. 6-23-4.

   DVR-28 (UC) : S/N 12501 and higher
   DVR-28P (UC) : S/N 11903 and higher
   DVR-28P (EK) : S/N 12001 and higher
   DVR-P28 (UC) : S/N 10401 and higher

   (2) Replace the necessary components and assemble them.

   Note : When replacing and assembling parts of the T5 Guide Ass'y, note the following:

   1. The set screw attached to the Flange Retainer limits the height of the T5 Guide. Do not turn the set screw unless necessary.
   2. When disassembling the T5 Guide Ass'y, confirm the number of spacers (R) in the upper and lower flange portions. Insert the same number of spacers (R) to the upper and lower flange portions when re-assembling.
   3. When replacing components, take care not to allow the spacers (R) to fall into the machine.

Adjustment

3. T5 Guide clearance adjustment
   (1) Using a thickness gauge, confirm that the clearance A (shown in Fig. 1 of Figure 6-23-4) between the lower end of the Roller Guide and lower flange meets the following specification.

   Specification : Clearance A
   A 0.03 mm thickness gauge goes through.
   A 0.06 mm thickness gauge does not go through.

   Note : When inserting the thickness gauge, note the following:

   1. Remove the rustproofing oil attached to the thickness gauge with a cloth moistened with cleaning liquid before carrying out the adjustment. Do not allow oil to adhere to the Roller Guide or the lower flange.
   2. Take care not to press the lower flange down when inserting the thickness gauge. If the lower flange moves downward, accurate adjustment is prevented.

   (2) If the specification is not met, change the number of spacers (R) used on the lower flange side.

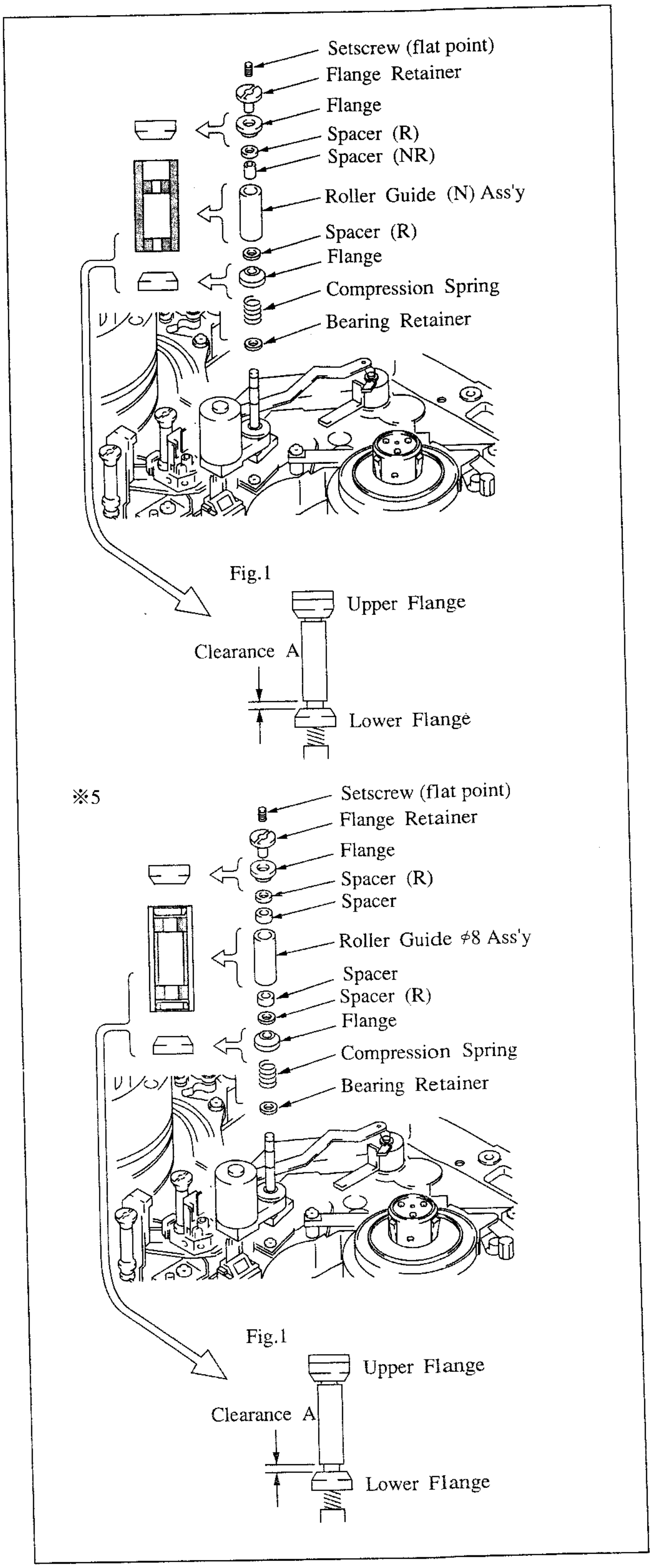
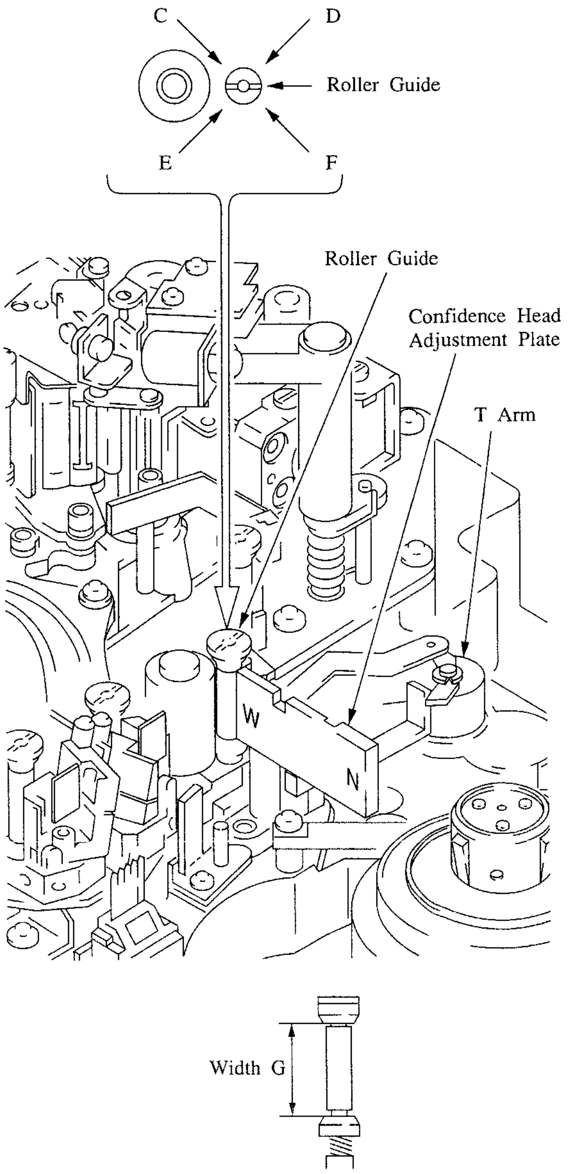

Setscrew (flat point)
Flange Retainer
Flange
Spacer (R)
Spacer (NR)
Roller Guide (N) Ass'y
Spacer (R)
Flange
Compression Spring
Bearing Retainer
Fig.1
Upper Flange
Clearance A
Lower Flange
※5
Setscrew (flat point)
Flange Retainer
Flange
Spacer (R)
Spacer
Roller Guide φ8 Ass'y
Spacer
Spacer (R)
Flange
Compression Spring
Bearing Retainer
Fig.1
Upper Flange
Clearance A
Lower Flange

Fig. 6-23-4 T5 Guide Ass'y Replacement

4. T5 Guide width adjustment (Figure 6-23-5)
   (1) Press the Confidence Head Adjustment Plate to the Roller Guide in the directions, indicated by C, D, E, and F shown in the figure. Confirm that the N side of the Confidence Head Adjustment Plate can pass the width G between upper and lower flanges (four places), and that the W side cannot be inserted to at least one place.
   (2) If step (1) is not satisfied, change the number of spacers (R) used on the upper flange side shown in Fig. 6-23-4.
   (3) After adjustment, turn the Roller Guide portion by hand and confirm that it turns smoothly. If not, repeat steps (1) and (2).

Note : When T5 Guide width adjustment is performed, note the following:

1. Before using the Confidence Head Adjustment Plate, clean it with a cloth moistened with cleaning liquid.
2. When pressing the Confidence Head Adjustment Plate, take care not to press the lower flange down. If the lower flange moves downward, accurate adjustment is prevented.



(This illustration is DVR-28)

Fig. 6-23-5 T5 Guide Width Adjustment

5. T5 Guide height adjustment
   (1) Set the Reference Plate shown in Figure 6-23-6 to the machine.

   Note : When the reference plate is set, the Table must be set at the M or L cassette position.
   Set the reel position by referring to Basic Knowledge in Section 6-7.

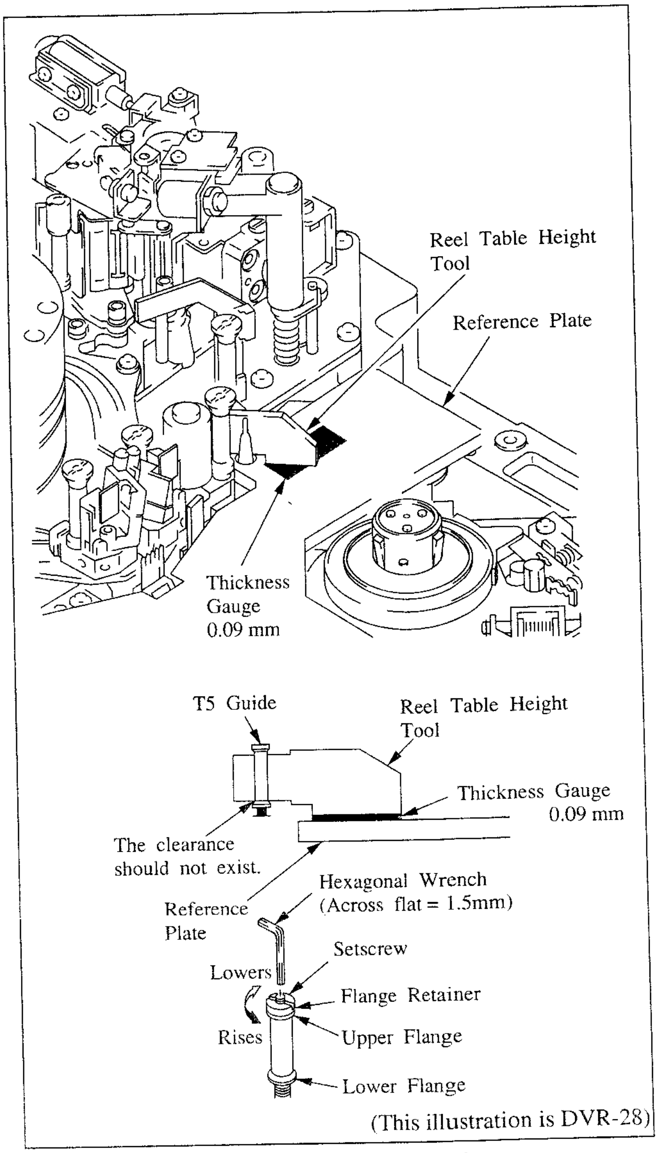
   (2) Set the place a 0.09 mm Thickness Gauge on the Reference Plate and set the Reel Table Hight Adjustment Tool to the place indicated in the figure, then press it to the Roller Guide portion of the T5 Guide. Confirm that there is no clearance at the T5 Guide lower flange and the lower end of the Reel Table Height Adjustment Tool.

   Note : When T5 Guide height adjustment is performed, note the following:
   1. Before using the Reel Table Height Adjustment Tool, clean it with a cloth moistened with cleaning liquid.
   2. When pressing the Reel Table Heigh Adjustment Tool to the Roller Guide portion, take care not to press the lower flange down. If the lower flange moves downward, accurate adjustment is prevented.

   (3) If step (2) cannot be satisfied, turn the set screw of the Flange Retainer counterclockwise by 1/2 to 1 turn and loosen it. Adjust the Flange Retainer by turning it as follows:
   Use a hexagonal wrench (across flats of 1.5 mm).
   When there is clearance between the Reel Table Height Adjustment Tool and the lower flange, turn the Flange Retainer counterclockwise.
   When the Reel Table Height Adjustment Tool presses the lower flange down, turn the Flange Retainer clockwise.
   (4) Tighten the set screw after adjustment.
   Tightened torque: 58.8×10^{-2} N·m (6 kgf·cm)
   (5) Turn the Worm Gear portion of the Loading Motor shown in Figure 6-23-7 in the direction indicated by arrow A, then separate the T Drawer Arm Ass'y from the stopper by 3 to 4 mm (in the threading-end direction). Turn the Worm Gear portion of the Loading Motor in direction B, then press the T Drawer Arm Ass'y to the stopper.
   (6) Confirm step (2) again.
   (7) Remove the Reference Plate from the machine.

6. Cassette Compartment Ass'y installation
   Refer to Section 6-5.

7. Tape transport adjustment
   Refer to Section 9.


Reel Table Height Tool
Reference Plate
Thickness Gauge 0.09 mm
T5 Guide
Reel Table Height Tool
Thickness Gauge 0.09 mm
The clearance should not exist.
Hexagonal Wrench (Across flat = 1.5mm)
Reference Plate
Setscrew
Lowers
Flange Retainer
Rises
Upper Flange
Lower Flange

(This illustration is DVR-28)

Fig. 6-23-6 T5 Guide Height Adjustment

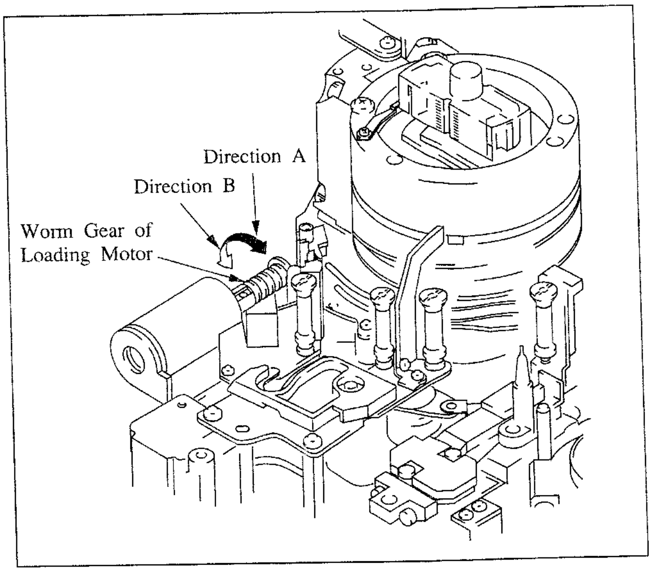

Direction A
Direction B
Worm Gear of Loading Motor

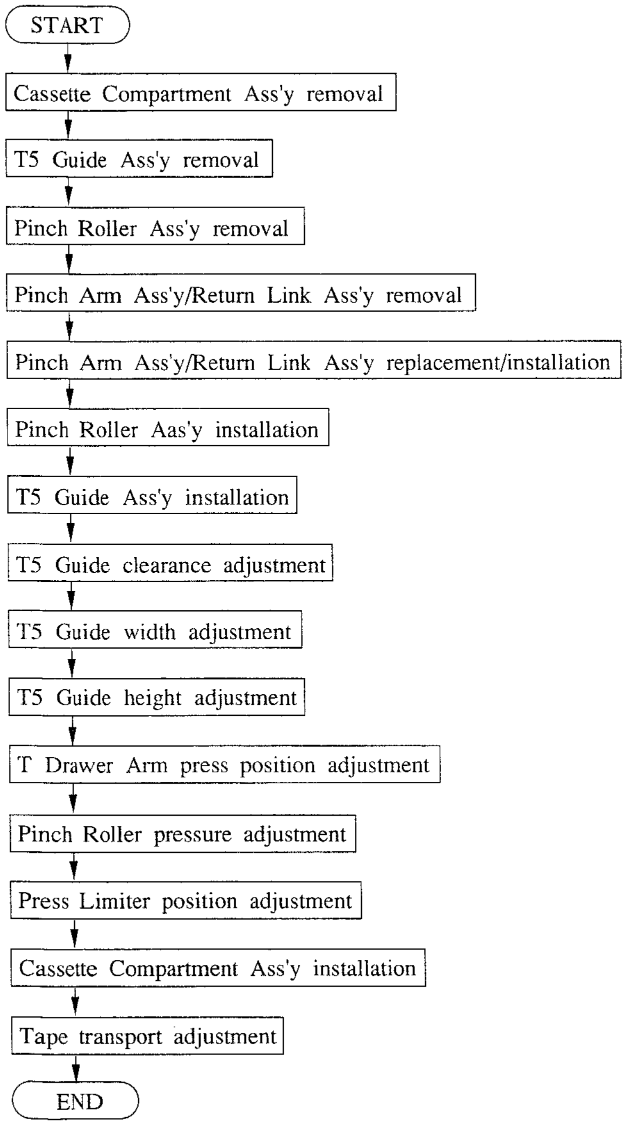
Fig. 6-23-7 Worm Gear of Loading Motor

6-23-3. Pinch Arm Ass'y and Return Link Ass'y Replacement

Basis Knowledge

A. Remove the following Ass'y before replacing the Pinch Arm Ass'y and Return Link Ass'y.
  - Cassette Compartment Ass'y
  - T5 Guide Ass'y
  - Pinch Roller Ass'y

B. Replacement flowchart


START
Cassette Compartment Ass'y removal
T5 Guide Ass'y removal
Pinch Roller Ass'y removal
Pinch Arm Ass'y/Return Link Ass'y removal
Pinch Arm Ass'y/Return Link Ass'y replacement/installation
Pinch Roller Aas'y installation
T5 Guide Ass'y installation
T5 Guide clearance adjustment
T5 Guide width adjustment
T5 Guide height adjustment
T Drawer Arm press position adjustment
Pinch Roller pressure adjustment
Press Limiter position adjustment
Cassette Compartment Ass'y installation
Tape transport adjustment
END

Removal

1. Cassette Compartment Ass'y removal
   Refer to Section 6-5.

2. T5 Guide Ass'y removal
   Refer to step 2 of Section 6-23-2.

3. Pinch Roller Ass'y removal
   Refer to step 2 of Section 6-23-1.
   - When only the Return Link Ass'y is replaced, the Pinch Roller Ass'y does not need to be removed.

4. Pinch Arm Ass'y/Return Link Ass'y removal
   (Figure 6-23-8)
   (1) Remove the E ring fixing the Pinch Arm Ass'y shown in the figure.
   (2) Remove the C ring fixing the Pinch Spacer shown in the figure. Remove the Motor Spacer and Leaf spring from the T5 Guide Shaft.
   (3) Remove the Stopper Pin fixing the Return Link Ass'y.
   (4) Pull out the Pinch Arm Ass'y and the Return Link Ass'y from the T Arm Ass'y as shown in the figure.
   (5) Remove the Pinch Spacer from the T Arm.

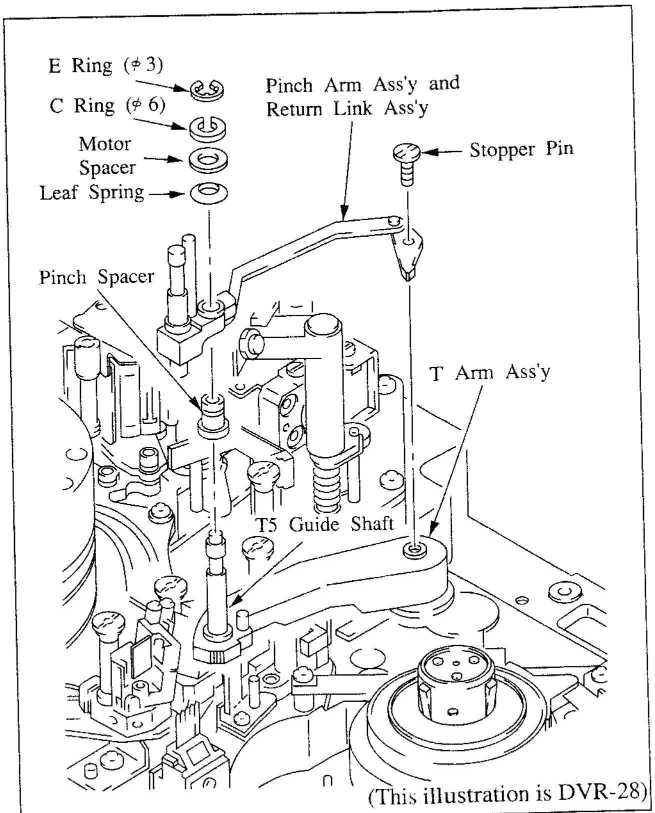

E Ring (ϕ 3)
C Ring (ϕ 6)
Motor Spacer
Leaf Spring
Pinch Arm Ass'y and Return Link Ass'y
Stopper Pin
Pinch Spacer
T Arm Ass'y
T5 Guide Shaft
(This illustration is DVR-28)

Fig. 6-23-8 **Pinch Arm Ass'y/Return Link Ass'y Removal**

(6) Remove the E ring shown in the figure.
Remove the Pinch Arm Return Spring while lifting the Return Link Ass'y in the direction shown in the figure.

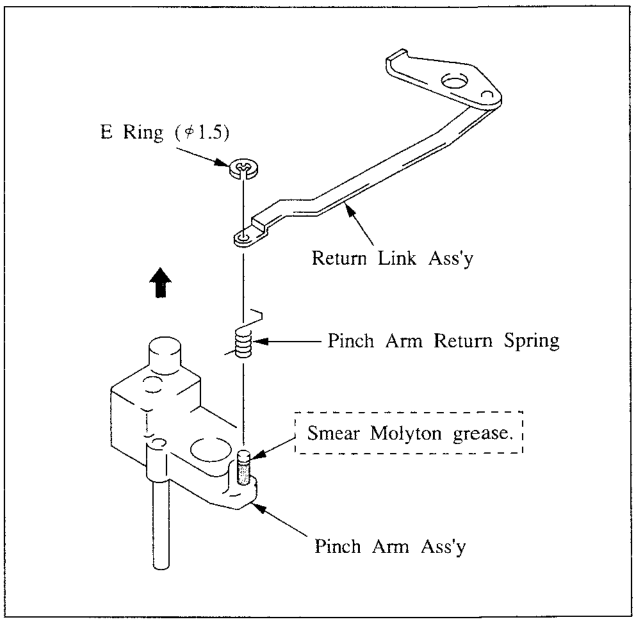


Fig. 6-23-9 Return Link Arm Ass'y Removal

Replacement/Installation

5. Pinch Arm Ass'y/Return Link Ass'y replacement/installation
   (1) Replace the necessary components.
   (2) Clean the installation surface of all components with a cloth moistened with cleaning liquid.
   (3) Smear a small amount of Molyton grease to the Pinch Arm Ass'y Shaft shown in Figure 6-23-9.
   (4) Smear a small amount of Molyton grease to the T5 Guide Shaft shown in Figure 6-23-10.

   Note : Do not smear Molyton grease to portions other than indicated in the figure.

   (5) Assemble the Pinch Arm Ass'y and the Return Link Ass'y in the reverse order of steps 3 and 4.

   Note : After removing the E ring shown in the figure, replace the E ring with a new part.

6. Pinch Roller Ass'y installation
   Refer to Section 6-23-1, step 3.

7. T5 Guide Ass'y installation
   Refer to Section 6-23-1, step 2.

Adjustment

8. T5 Guide clearance adjustment
   Refer to Section 6-23-2, step 3.

9. T5 Guide width adjustment
   Refer to Section 6-23-2, step 4.

10. T5 Guide height adjustment
    Refer to Section 6-23-2, step 5.

11. Confirm the following and adjust them if necessary.
    This step is performed only when the Pinch Arm Ass'y is replaced.
    - T Drawer Arm press position adjustment
    - Pinch Roller pressure adjustment
    - Press Limiter position adjustment
    Refer to Section 6-26-1.

12. Cassette Compartment Ass'y installation
    Refer to Section 6-5.

13. Tape transport adjustment
    See Section 9.

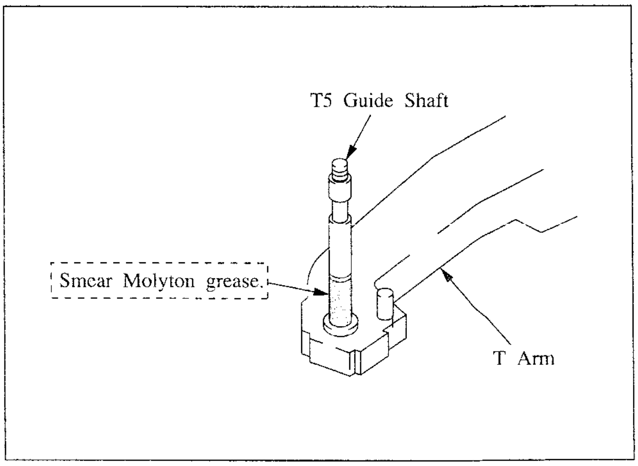


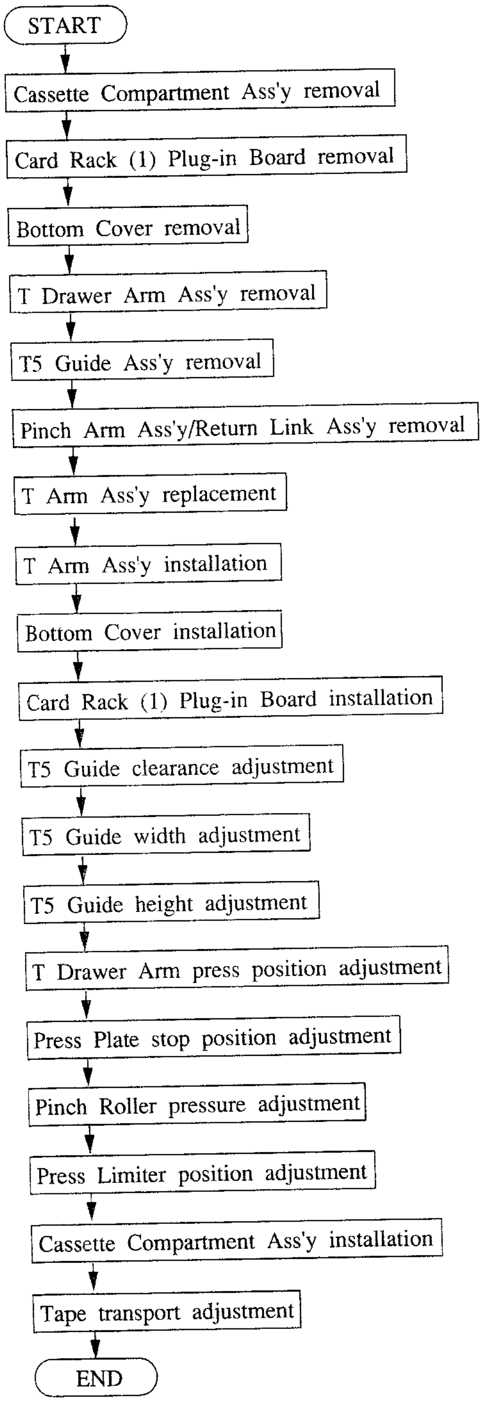
Fig. 6-23-10 Molyton Grease Smearing

6-23-4. T Arm Ass'y Replacement

Basic knowledge

A. The following parts must be removed before replacing the T Arm Ass'y.
- Cassette Compartment Ass'y
- Card Rack (1) Plug-in Board
- Bottom Cover

B. Replacement flowchart


START
Cassette Compartment Ass'y removal
Card Rack (1) Plug-in Board removal
Bottom Cover removal
T Drawer Arm Ass'y removal
T5 Guide Ass'y removal
Pinch Arm Ass'y/Return Link Ass'y removal
T Arm Ass'y replacement
T Arm Ass'y installation
Bottom Cover installation
Card Rack (1) Plug-in Board installation
T5 Guide clearance adjustment
T5 Guide width adjustment
T5 Guide height adjustment
T Drawer Arm press position adjustment
Press Plate stop position adjustment
Pinch Roller pressure adjustment
Press Limiter position adjustment
Cassette Compartment Ass'y installation
Tape transport adjustment
END

Removal

1. Cassette Compartment Ass'y removal
   Refer to Section 6-5.

2. Card Rack (1) Plug-in Board removal
   Refer to Section 6-2.

3. Bottom Cover removal
   Refer to Section 6-2.

4. T Drawer Arm Ass'y removal
   (1) By hand, turn the Worm Gear portion of the Loading Motor shown in Figure 6-23-11 in the direction indicated by arrow A, then pull out the T Drawer Arm Ass'y to the place indicated in Figure 6-23-12.

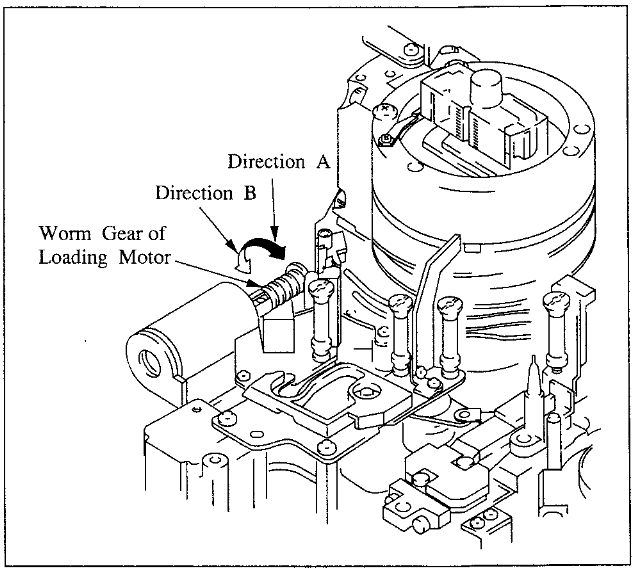


Fig. 6-23-11 Worm Gear of The Loading Motor

   (2) Remove the E ring fixing the T Load Link.
   (3) Turn the Worm Gear portion of the Loading Motor by hand in the direction indicated by arrow B and set the T Drawer Arm Ass'y to the unthreading-end.

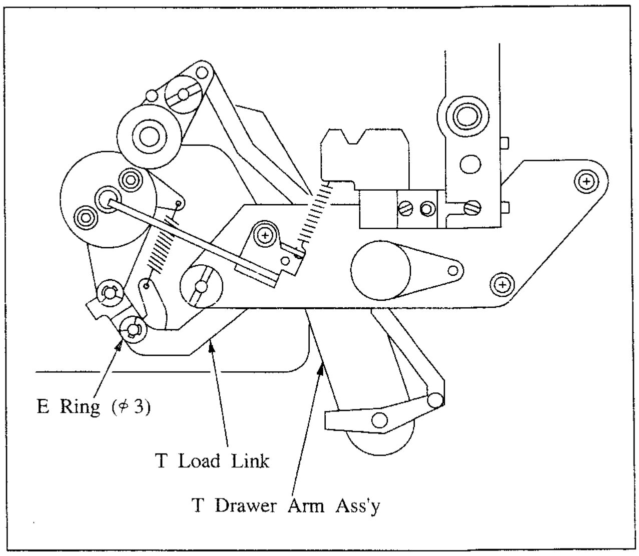


Fig. 6-23-12 E ring (1) Removal

   (4) Remove the screw fixing the T Arm Ass'y shown in Figure 6-23-13.

   Note : When the screw is removed, the coil spring, Motor Spacer, and ball bearing are also removed together. Take care not to allow them to fall into the machine.

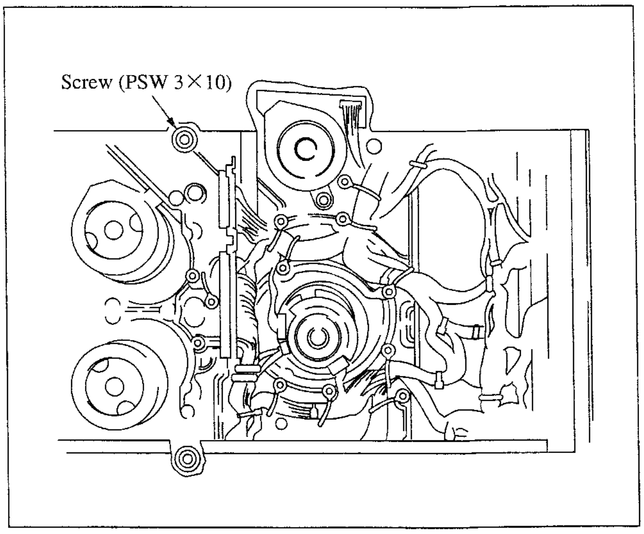
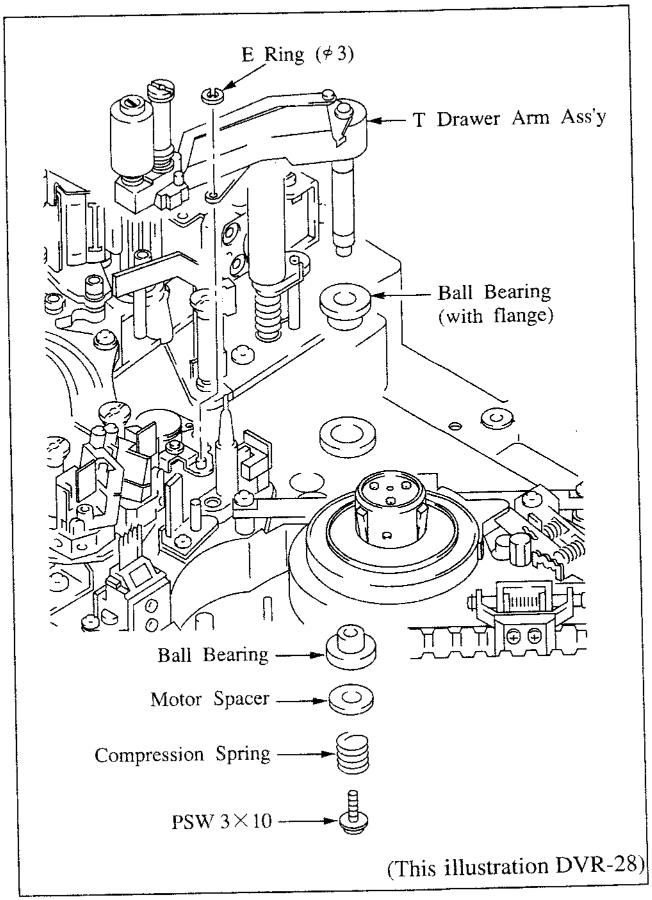


Fig. 6-23-13 T Arm Ass'y Fixing Screw Removal

(5) Return the machine to the former state.
Pull out the T Drawer Arm Ass'y shown in Figure 6-23-14.
Replace parts of the T Arm Bearing portion if necessary in this step.


E Ring (ϕ 3)
T Drawer Arm Ass'y
Ball Bearing (with flange)
Ball Bearing
Motor Spacer
Compression Spring
PSW 3×10

(This illustration DVR-28)

Fig. 6-23-14 T Drawer Arm Ass'y Installation

5. T5 Guide Ass'y removal
Refer to step 2 of Section 6-23-2.

Note : The parts with ※5 mark were changed on the following sets as shown in Fig. 6-23-15.

DVR-28 (UC) : S/N 12501 and higher
DVR-28P (UC) : S/N 11903 and higher
DVR-28P (EK) : S/N 12001 and higher
DVR-P28 (UC) : S/N 10401 and higher

6. Pinch Arm Ass'y/Return Link Ass'y removal
Refer to Section 6-23-3, step 4.

Note : When removing the Pinch Arm Ass'y and Return Link Ass'y, remove the Pinch Roller Ass'y and Pinch Spacer together with them. (Figure 6-23-15)

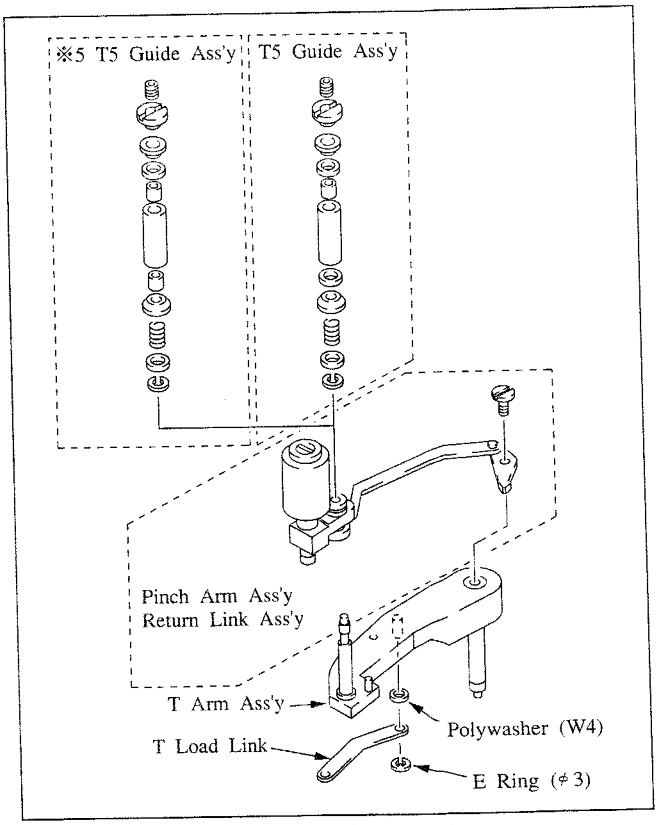

※5 T5 Guide Ass'y
T5 Guide Ass'y
Pinch Arm Ass'y
Return Link Ass'y
T Arm Ass'y
T Load Link
Polywasher (W4)
E Ring (ϕ 3)

Fig. 6-23-15 T Arm Ass'y Replacement

Replacement/Installation

7. T Arm Ass'y replacement
   (1) Replace the T Arm Ass'y and install the components removed at steps 4, 5, and 6.
   (2) Clean the installation surface of all components with a cloth moistened with cleaning liquid.
   Wipe the installation surface two or three times with a dry cloth after cleaning.

   Note : Clean the upper and lower ends and the inside and outside of the ball bearing.

8. T Drawer Arm Ass'y installation
   Install the T Arm Ass'y in the reverse order of step 4.

9. Bottom cover installation
   Refer to Section 6-2.

10. Card Rack (1) Plug-in Board installation
    Refer to Section 6-2.

Adjustment

11. T5 Guide clearance adjustment
    Refer to Section 6-23-2, step 3.

12. T5 Guide width adjustment
    Refer to Section 6-23-2, step 4.

13. T5 Guide height adjustment
    Refer to Section 6-23-2, step 5.

14. Confirm the following and adjust them if necessary.
    - T Draewr Arm press position adjustment
    - Press Plate stop position adjustment
    - Pinch Roller pressure adjustment
    - Press Limiter position adjustment

    Refer to Section 6-26-1.

15. Cassette Compartment Ass'y installation
    Refer to Section 6-5.

16. Tape transport adjustment
    Refer to Section 9.

6-24. STATIONARY HEAD ASS'Y REPLACEMENT

A. Fig. 6-24-1 shows the Stationary Head Ass'y. Explanations of how to replace the Stationary Head Ass'y are provided in the following sections:
6-24-1. Stationary R/P Head Replacement
6-24-2. Confidence Head Replacement
6-24-3. T3 Guide Ass'y Replacement

B. Prepare the following materials.
- Master Block (S3)
  Sony Parts No. : J-6253-340-A
- Confidence Head Adjustment Plate
  Sony Parts No. : J-6257-140-A

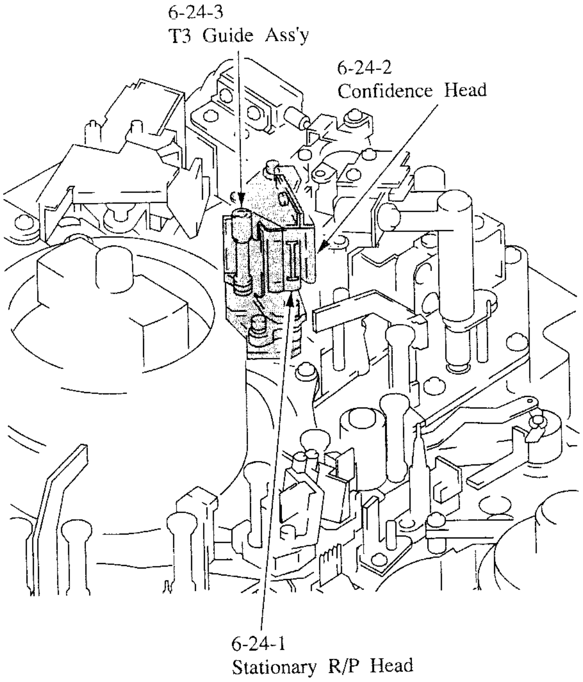

6-24-3
T3 Guide Ass'y
6-24-2
Confidence Head
6-24-1
Stationary R/P Head

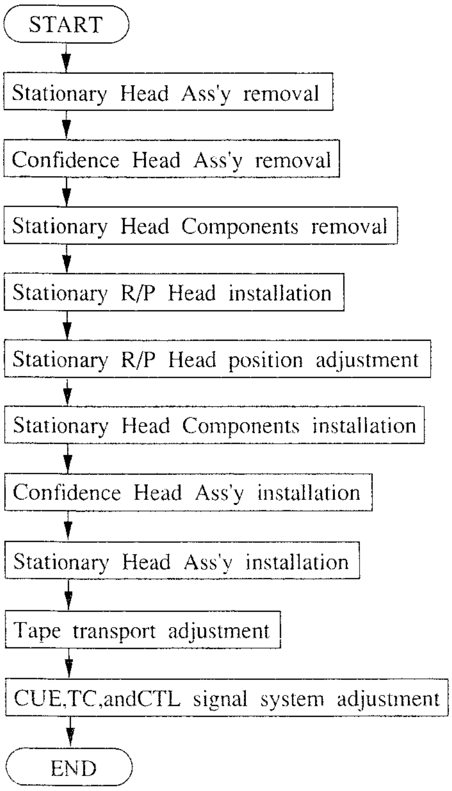
Fig. 6-24-1 **Stationary Head Ass'y**

6-24-1. Stationary R/P Head Replacement

Basic Knowledge

A. Dismount the following parts before replacing the Stationary R/P Head.
  - Stationary Head Ass'y
  - Confidence Head Ass'y

B. Replacement flowchart


START
Stationary Head Ass'y removal
Confidence Head Ass'y removal
Stationary Head Components removal
Stationary R/P Head installation
Stationary R/P Head position adjustment
Stationary Head Components installation
Confidence Head Ass'y installation
Stationary Head Ass'y installation
Tape transport adjustment
CUE,TC,andCTL signal system adjustment
END

1. Stationary Head Ass'y removal
   (1) Disconnect the connector from the AH-38 Board. (Fig. 6-24-2)
   (2) Dismount the harness from the harness clamp which fixes the harness.

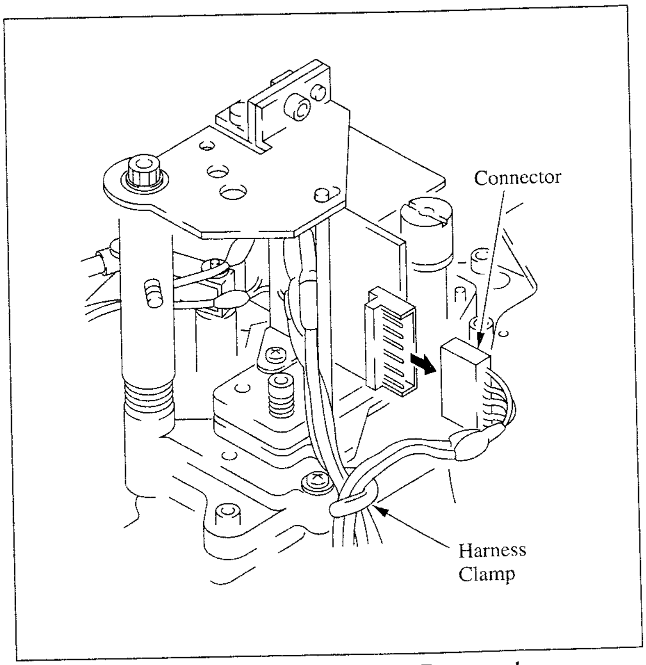

Connector
Harness Clamp

Fig. 6-24-2 AH-38 Board Connector Removal

   (3) Remove the two screws which lock the Stationary Head Ass'y and dismount the Stationary Head Ass'y from the machine. (Fig. 6-24-3)
   Hexagonal wrench : 2.5 mm in width across flats

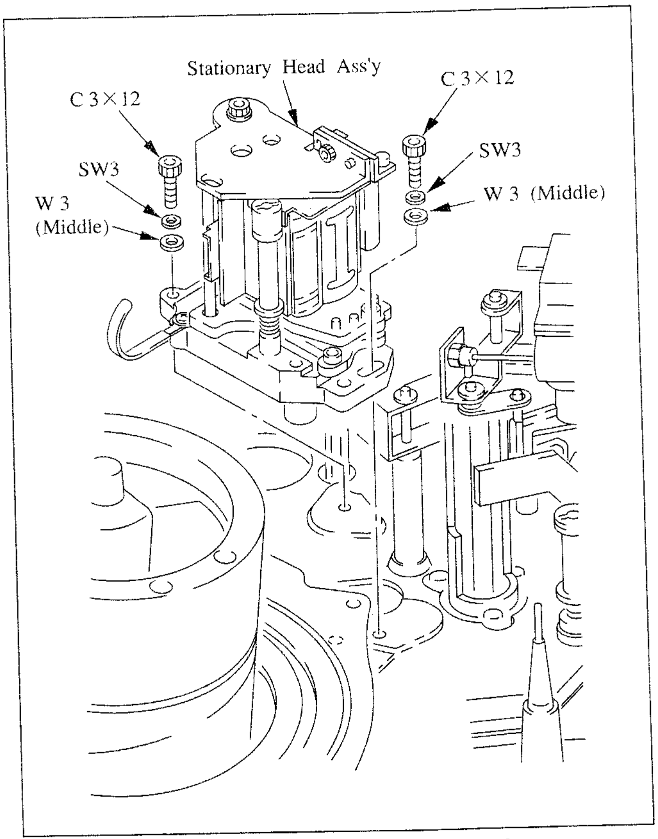

Stationary Head Ass'y
C 3×12
C 3×12
SW3
SW3
W 3 (Middle)
W 3 (Middle)

Fig. 6-24-3 Stationary Head Ass'y Removal

(4) Dismount the harness from the AH-38 Board and the AH-26 Board shown in Fig. 6-24-4.

Note : In removing the solder, do not overheat the terminal part. If it is overheated, the coil in the head may be damaged.

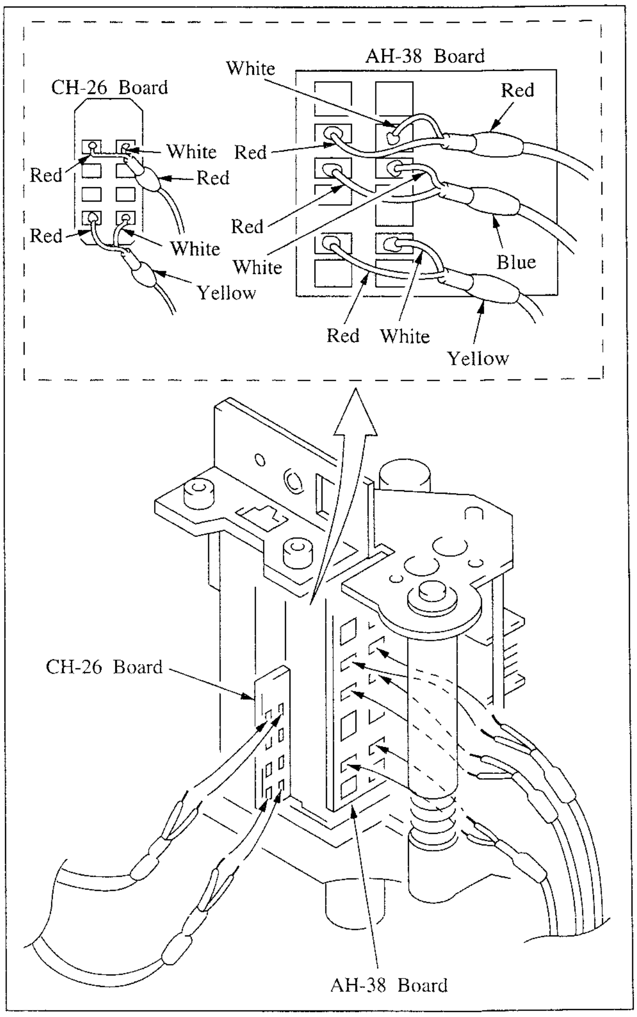

White
AH-38 Board
CH-26 Board
Red
White
Red
Red
Red
Red
Red
White
Red
White
Blue
Yellow
Red
White
Yellow
CH-26 Board
AH-38 Board

Fig. 6-24-4 Harness Removal

2. Confidence Head Ass'y removal (Fig. 6-24-5)
   - Remove the screw (C 3×10) that locks the Confidence Head Ass'y, loosen the setscrew (flat point 3×3), and dismount the Confidence Head Ass'y.
     Use hexagonal wrenches (across flats of 2.5 mm).
     (across flats of 1.5 mm).

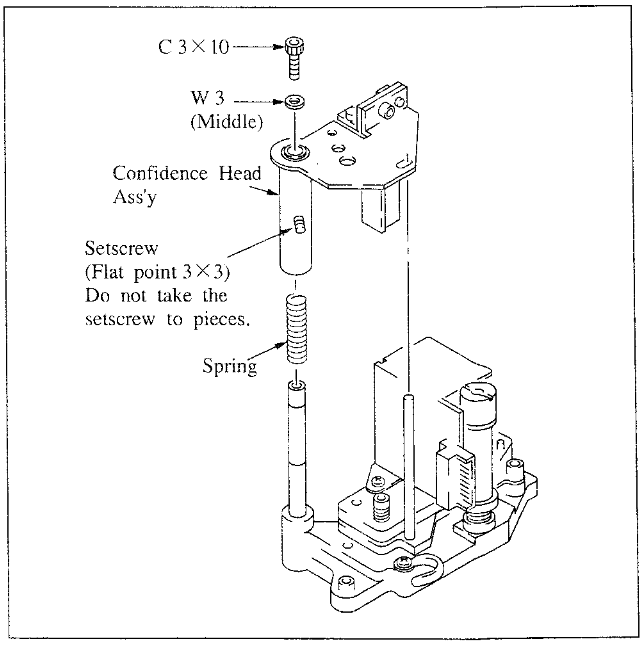

C 3×10
W 3
(Middle)
Confidence Head
Ass'y
Setscrew
(Flat point 3×3)
Do not take the
setscrew to pieces.
Spring

Fig. 6-24-5 Confidence Head Ass'y Removal

3. Stationary Head Components removal
   Stationary R/P Head removal (Fig. 6-24-6)
   (1) Dismount the AH-38 Board shown in the figure from the Stationary R/P Head Ass'y.

   Note : In removing the solder, do not overheat the terminal part. If it is overheated, the coil in the head may be damaged.

   (2) Remove the screw which locks the AU Shield Plate and dismount the plate.
   (3) Remove the two screws that lock the Fixed R/P Head, then remove the Stationary R/P Head.

   Note : Do not loosen screws [especially three setscrews (M3)] other than the screws that lock the Stationary R/P Head.

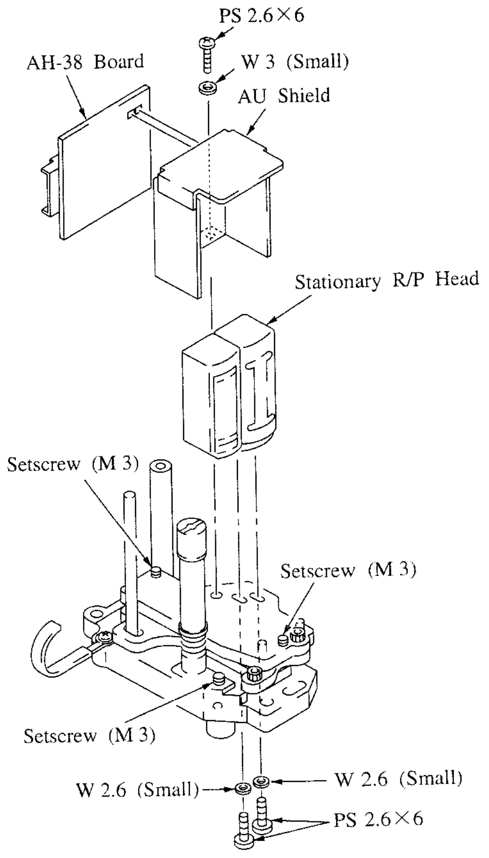

PS 2.6×6
AH-38 Board
W 3 (Small)
AU Shield
Stationary R/P Head
Setscrew (M 3)
Setscrew (M 3)
Setscrew (M 3)
W 2.6 (Small)
W 2.6 (Small)
PS 2.6×6

Fig. 6-24-6 Stationary R/P Head Rmoval

4. Stationary R/P Head installation (Fig. 6-24-7)
   - Temporarily fix a new Stationary R/P Head with the two screws.

Note : Before attaching the Head, clean the mounting surface of the Stationary R/P Head and illustrated area of the AU Adapter Plate with a cloth moistened with cleaning liquid.

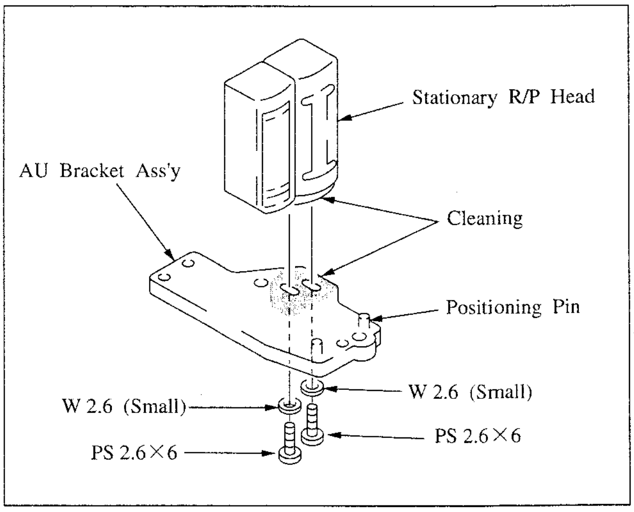

Stationary R/P Head
AU Bracket Ass'y
Cleaning
Positioning Pin
W 2.6 (Small)
W 2.6 (Small)
PS 2.6×6
PS 2.6×6

Fig. 6-24-7 Stationary R/P Head Installation

5. Stationary R/P Head position adjustment (Fig. 6-24-8)
   (1) Clean the tape running surface of the Stationary R/P Head with a cloth moistened with cleaning liquid.
   (2) Put the Confidence Head Adjustment Plate between the Stationary R/P Head and the positioning pin shown in the figure.

Note : Place the Confidence Head Adjustment Plate with the tool-number mark opposite to the Stationary R/P Head.

   (3) Push the Stationary R/P Head in the direction pointed by the arrow B. Tighten the two screws so that clearances B and C meet the specification below:

Specification : Clearance B of 0.03 mm or below
Clearance C of 0.03 mm or below

If clearances B and C fail to meet the above specification, retry from step (1).

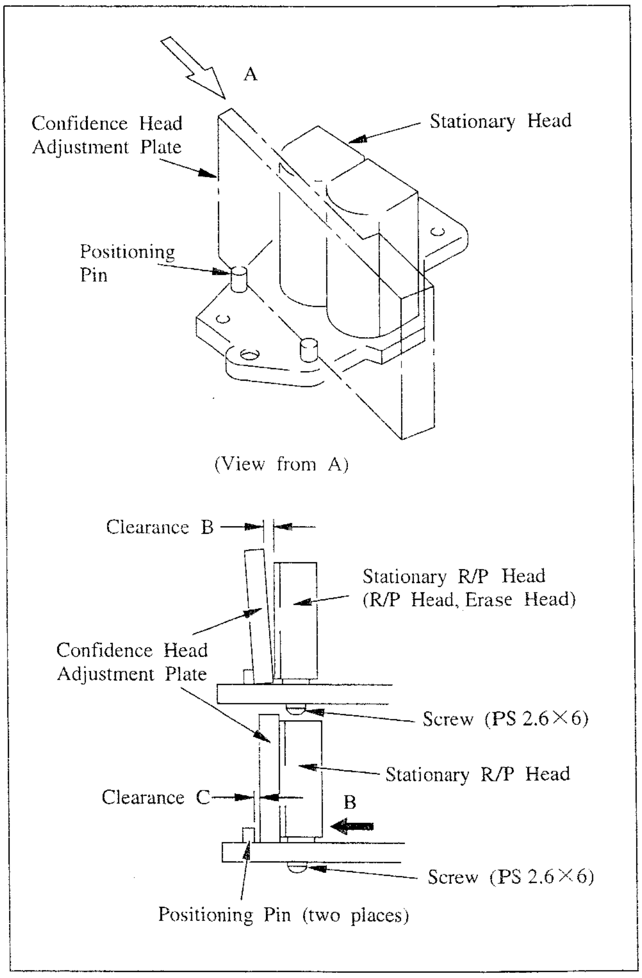

A
Confidence Head Adjustment Plate
Stationary Head
Positioning Pin
(View from A)
Clearance B
Stationary R/P Head (R/P Head, Erase Head)
Confidence Head Adjustment Plate
Screw (PS 2.6×6)
Stationary R/P Head
Clearance C
B
Screw (PS 2.6×6)
Positioning Pin (two places)

Fig. 6-24-8 Stationary R/P Head Position Adjustment

6. Stationary Head components installation
   Mount the components by reversing the procedure in step 3. In mounting the AU Shield Plate and the AH-38 Board, use the following procedure. After replacing components, such as screws, of the AU Base Ass'y shown in Fig. 6-24-6, make sure that they are mounted as shown in Fig. 6-24-6.

   (1) AU Shield Plate installation (Fig. 6-24-9)
   Temporarily fix the AU Shield on the AU Adapter Plate with the screw.

   (2) AH-38 Board installation
      (1) Fit the AH-38 Board to the twelve pins of the Stationary Head and solder them together while pushing the AH-38 Board from the Stationary Head in the direction of arrow A to prevent the Board from being lifted.
      (2) Move the AU Shield Plate a little aside in the direction indicated by arrows B and C and tighten the screw which was fixed temporarily in step (1).

7. Confidence Head Ass'y installation
   Reverse the procedure in step 2.

8. Stationary Head Ass'y installation
   Reverse the procedure in step 1.

9. Tape transport adjustment
   Make the following adjustments by referring to Section 9.
   ㉖ Fixed R/P Head azimuth adjustment
   ㉗ Fixed R/P Head height adjustment
   ㉘ Confidence Head height adjustment
   ㉙ CTL position adjustment
   ㉚ PG phase adjustment

10. CUE, TC, and CTL signal system adjustment
    Refer to Section 11.

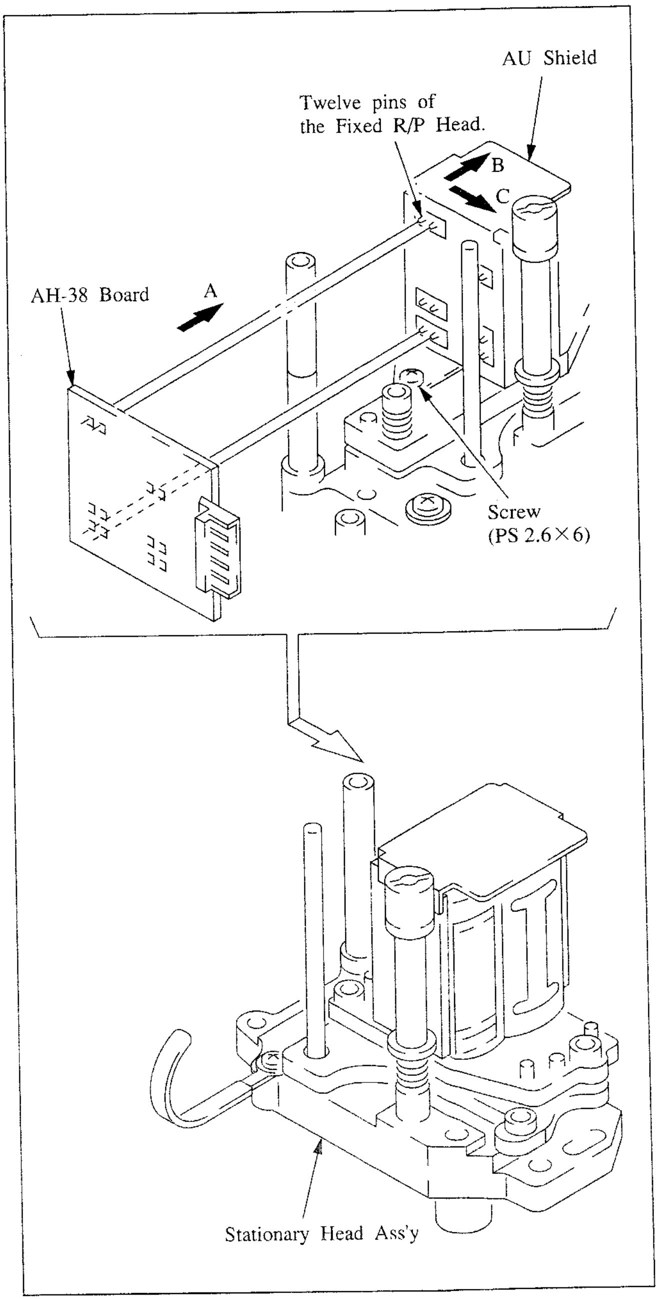


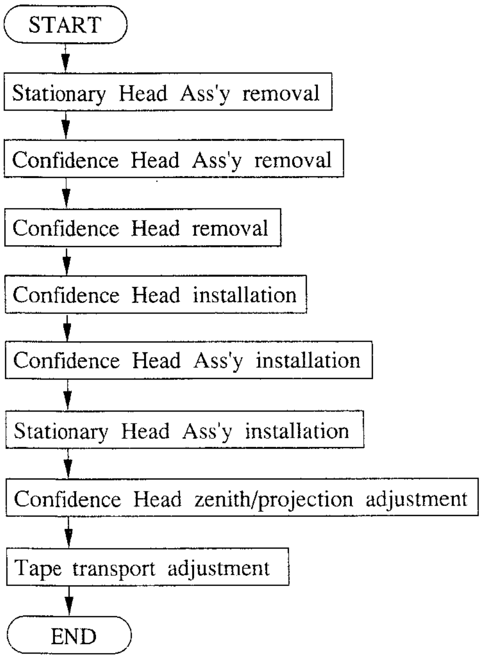
Fig. 6-24-9 AU Shield Plate/AH-38 Board Installation

6-24-2. Confidence Head replacement

Basic Knowledge

A. Dismount the Stationary Head Ass'y before replacing the Fixed Confidence Head. (However, it is unnecessary to dismount the AH-38 Board which is attached to the Fixed R/P Head.)

B. Replacement flowchart


START
Stationary Head Ass'y removal
Confidence Head Ass'y removal
Confidence Head removal
Confidence Head installation
Confidence Head Ass'y installation
Stationary Head Ass'y installation
Confidence Head zenith/projection adjustment
Tape transport adjustment
END

Replacement

1. Stationary Head Ass'y removal
   Refer to Section 6-24-1.

2. Confidence Head Ass'y removal (Fig. 6-24-10)
   - Remove the screw (C 3×10) fixed the confidence Head Ass'y.
     Loosen the setscrew (flat point 3x3) and remove the Confidence Head Ass'y.
     Use hexagonal wrenches (across flats of 2.5 mm).
     (across flats of 1.5 mm).

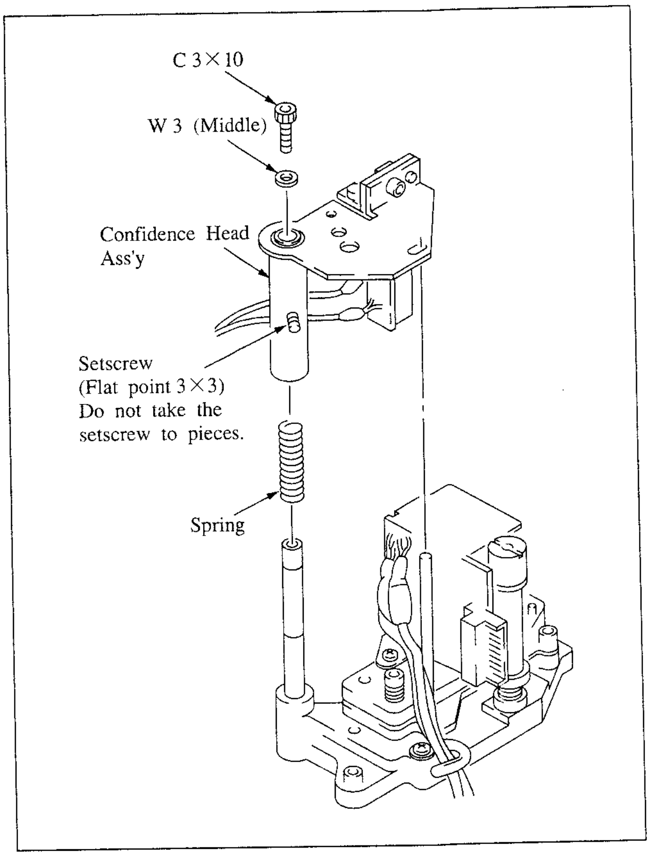

C 3×10
W 3 (Middle)
Confidence Head Ass'y
Setscrew
(Flat point 3×3)
Do not take the setscrew to pieces.
Spring

Fig. 6-24-10 Confidence Head Ass'y Removal

3. Confidence Head removal (Fig. 6-24-11)
   (1) Remove the two screws to dismount the Confidence Head.
   (2) Dismount the CH-26 Board from the Confidence Head.

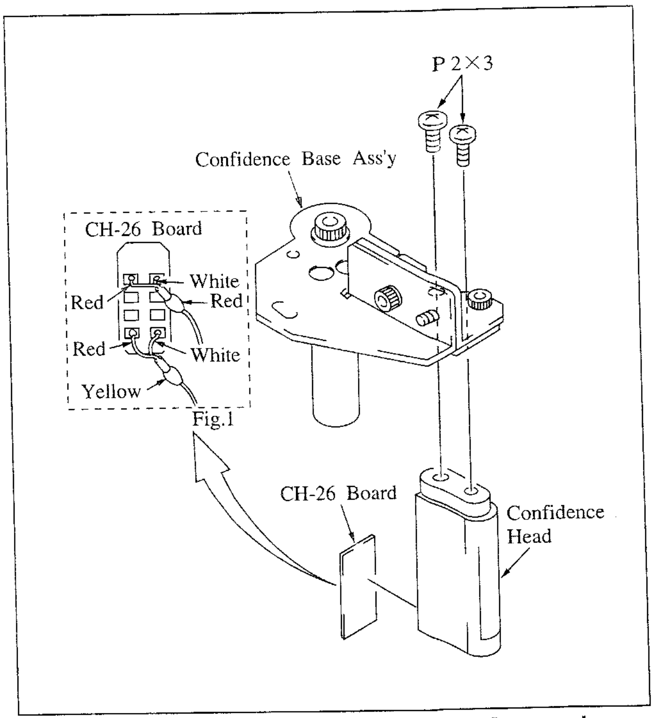

P 2×3
Confidence Base Ass'y
CH-26 Board
White
Red
Red
Red
White
Yellow
Fig.1
CH-26 Board
Confidence Head

Fig. 6-24-11 Stationary Confidence Head Removal

4. Confidence Head inatallation (Fig. 6-24-12)
   (1) Fit the CH-26 Board to the four pins of a new Confidence Head and solder them together while pushing the CH-26 Board in the direction of arrow A to prevent the Board from being lifted.
   (2) Fix the Confidence Head to the Confidence Bracket with the two screws.
   Tightened torque: 18.6×10^{-2} N·m (1.9 kgf·cm)

   Note : Before installation, clean the mounting face of the Confidence Head and the illustrated area of the Confidence Bracket with a cloth moistened with cleaning liquid.

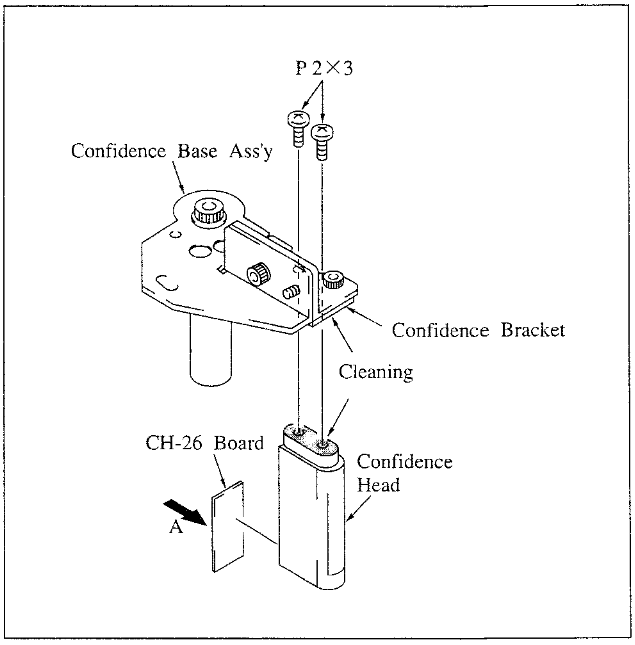

P 2×3
Confidence Base Ass'y
Confidence Bracket
Cleaning
CH-26 Board
Confidence Head
A

Fig. 6-24-12 Confidence Head Installation

5. Confidence Head Ass'y installation (Fig. 6-24-13)
   (1) Clean the shaft of the AU Base and the holes in the Confidence Head Ass'y with cloth or an applicator moistened with cleaning liquid. Smear a very small amount of Molyton grease to the inside circumferences of the holes in the Confidence Head Ass'y.
   (2) Fit the shaft into the holes of the Confidence Head Ass'y and tighten the screw (C3 x 10). Adjust the gap between the AU Shield and the Confidence Head Ass'y for 1.5 to 2 mm with the eye.
   (Fig. 2)
   Hexagon wrench key : across flats of 2.5 mm
   Tightened torque: 78.4×10^{-2} N·m (8 kgf·cm)
   (3) Tighten the setscrews.
   Hexagonal wrench : across flats of 1.5 mm
   Tightened torque: 78.4×10^{-2} N·m (8 kgf·cm)
   (4) Mount the harness on the CH-26 Board using a solder iron as shown in Fig. 1.

6. Stationary Head Ass'y installation
   Refer to Section 6-24-1.

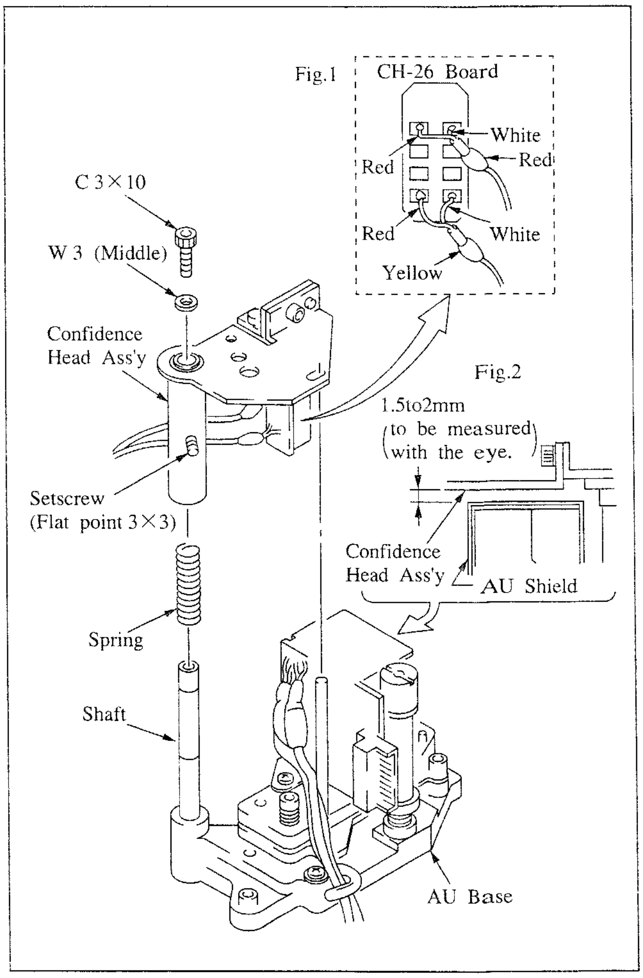


Fig.1
CH-26 Board
White
Red
Red
Red
White
Yellow
C 3×10
W 3 (Middle)
Confidence Head Ass'y
Fig.2
1.5to2mm
(to be measured with the eye.)
Confidence Head Ass'y
AU Shield
Setscrew (Flat point 3×3)
Spring
Shaft
AU Base

Fig. 6-24-13 Confidence Head Ass'y Installation

7. Confidence Head Zenith / Projection adjustment
   (Fig. 6-24-14)

   (1) Loosen screw a shown in the figure once. Then, fix it temporarily.

   (2) Place the Confidence Head Adjustment Plate lightly against the Confidence Head as illustrated.

   Note : Clean the Confidence Head Adjustment Plate and the Confidence Head with a cleaning piece where they come into contact.

   (3) Insert a screw driver (- 3) to hole d of the Confidence Bracket and adjust the Confidence Head in the direction of arrows A and B until clearance C in Fig. 1 becomes zero.
   (4) Tighten screw a.
   (5) Loosen the two screws b. Then, fix them temporarily.
   (6) Insert a screw driver (- 3) to hole e of the Confidence Bracket and adjust the Confidence Head in the direction of arrows C and D until clearance E in Fig. 2 becomes zero.
   (7) Tighten the two screws b.

8. Tape transport adjustment
   Go to step (28) in Tape Transport Adjustment/Tracking Adjustment in Section 9.

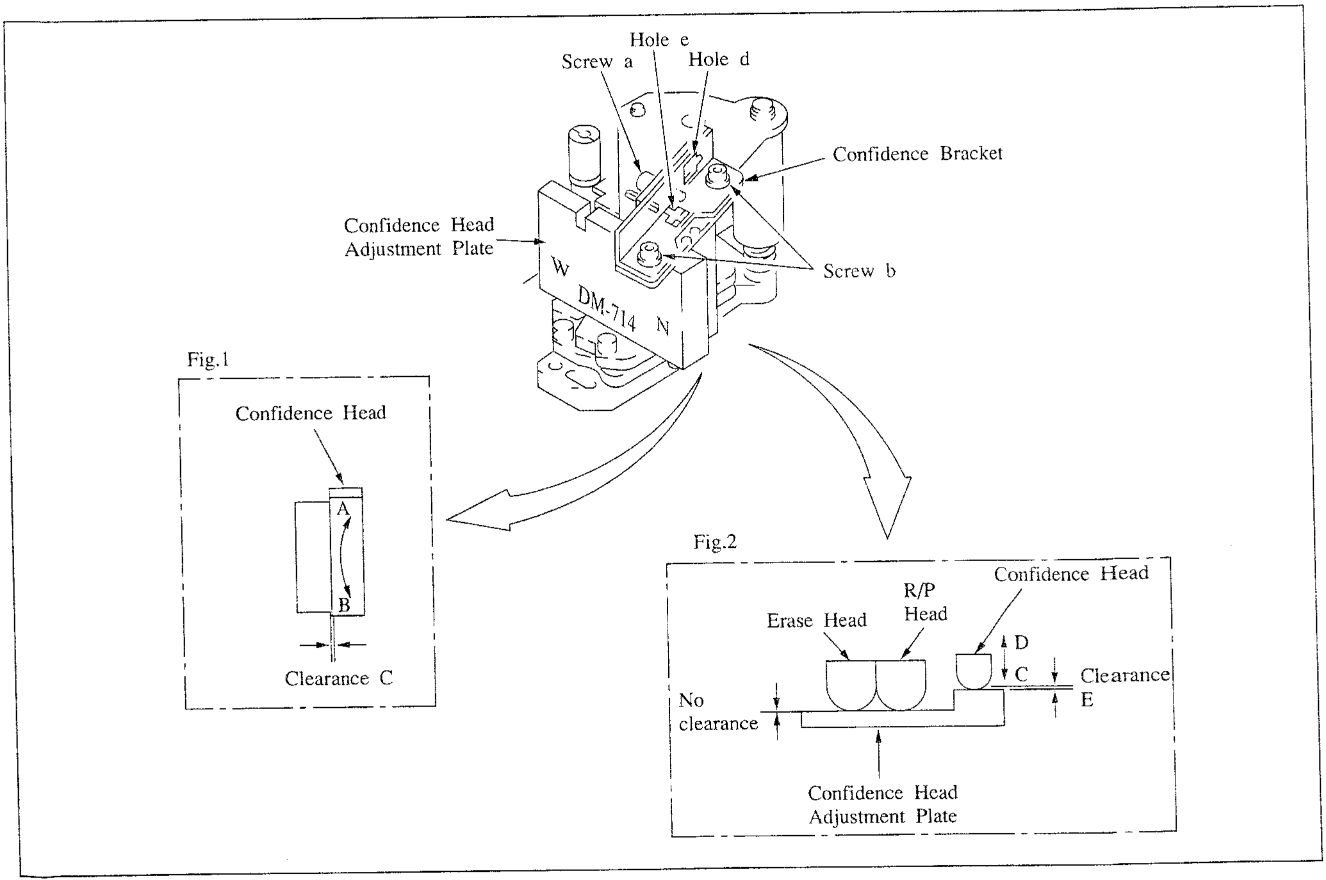
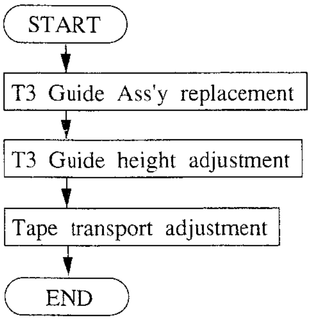

Hole e
Screw a
Hole d
Confidence Bracket
Confidence Head Adjustment Plate
Screw b
W
DM-714
N
Fig.1
Confidence Head
A
B
Clearance C
Fig.2
Confidence Head
R/P Head
Erase Head
D
C
Clearance E
No clearance
Confidence Head Adjustment Plate

Fig. 6-24-14 Confidence Head Zenith/Projection Adjustment

6-24-3. T3 Guide Ass'y replacement

Basic Knowledge

- Replacement flowchart


START
T3 Guide Ass'y replacement
T3 Guide height adjustment
Tape transport adjustment
END

Replacement

1. T3 Guide Ass'y replacement (Fig. 6-24-15)
   (1) Detach the Guide Retainer by turning it counterclockwise, and the T3 Guide will be able to be disassembled as shown in the figure.
   (2) Replace the necessary components.

Note : Take care of the following in replacing the components.

1. The setscrews attached to the Guide Retainer already regulate the height of the T3 Guide. Do not turn the setscrews except when necessary.
2. Before reassembling the T3 Guide Ass'y, clean the guide shafts, the sides of the T3 Guide, the peripheral surface and end-faces of the upper flange with a cloth moistened with cleaning liquid. Be sure to wipe them with dry cloth 2-3 times after cleaning.

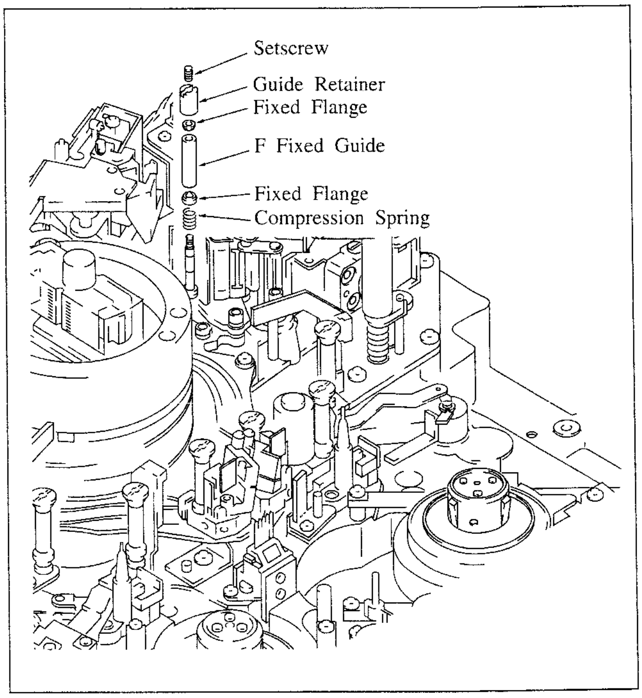

Setscrew
Guide Retainer
Fixed Flange
F Fixed Guide
Fixed Flange
Compression Spring

Fig. 6-24-15 T3 Guide Ass'y Replaement

Adjustment

2. T3 Guide height adjustment (Fig. 6-24-16)
   (1) Adjust the height by turning the Guide Retainer so that the illustrated area of the Erase Head and Stationary R/P Head is visually as high as the lower end of the Upper Flange.

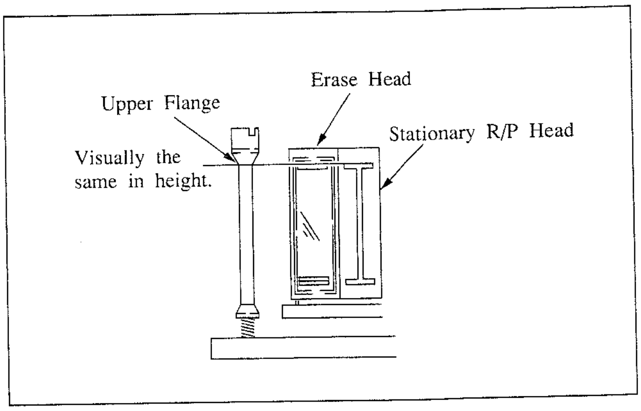

Erase Head
Upper Flange
Stationary R/P Head
Visually the same in height.

Fig. 6-24-16 T3 Guide Height Adjystment

   (2) Tighten the setscrews.
   Hexagonal wrench : across flats of 1.5 mm
   Tightened torque: 58.8×10^{-2} N·m (6 kgf·cm)

   Note : In each periodic inspection, loosen the Guide Retainer by turning it counterclockwise once or twice, and turn the Guide clockwise by 90 degrees as shown in the figure.

3. Tape transport adjustment
   Refer to Section 9.

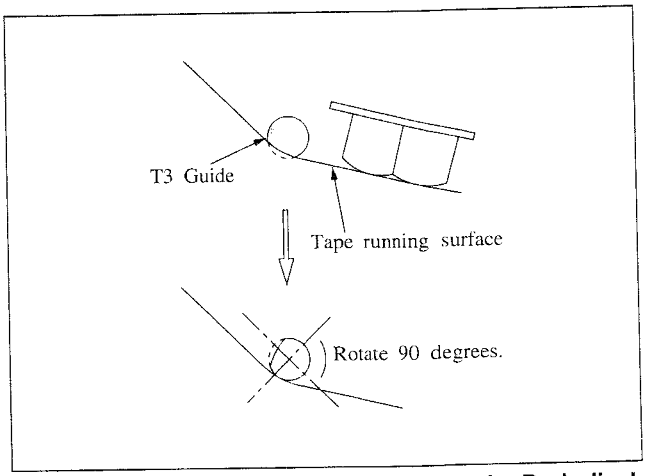

T3 Guide
Tape running surface
Rotate 90 degrees.

Fig. 6-24-17 T3 Guide Rotation Direction in Periodical Inspection

6-25. FE/TC ASS'Y REPLACEMENT

Basic Knowledge

A. Fig. 6-25-1 shows the FE/TC Ass'y block. Explanations of how to replace the FE/TC Ass'y are provided in the following sections:
   6-25-1. Full Erase Head Replacement
   6-25-2. S3 Guide Ass'y Replacement
   6-25-3. Tape Cleaner Block Component Replacement

B. The shape of the part of the FE/TC Ass'y vary with the serial numbers of the units. But the replacement procedures are all the same.
   [The Difference of the Part]
   1. Tape Cleaner (TC) Block
      The shape of the tape touch side at the TC Block vary from two edges to one edge.

      Applicable Serial Numbers

DVR-28 (UC)	S/N	11201 and higer
DVR-28P (EK,UC)	S/N	11401 and higer

   2. S3 Guide Block
      The Fix Shaft of the S3 Guide is short.

      Applicable Serial Numbers

DVR-28 (UC)	S/N	12101 and higer
DVR-28P (EK,UC)	S/N	11701 and higer

C. Do not touch the tape touch side at the TC block.

D. Prepare the following materials:
   - Tape Cleaner Adjustment Plate
     Sony Parts No. : J-6256-890-A
   - Reference Plate (28) DM-739
     Sony Parts No. : J-6257-390-A
   - Master Block (S3)
     Sony Parts No. : J-6253-340-A
   - Cleaning Piece
     Sony Parts No. : 2-034-697-00
   - Cleaning Liquid (or the equivalent)
     Sony Parts No. : 9-919-573-00

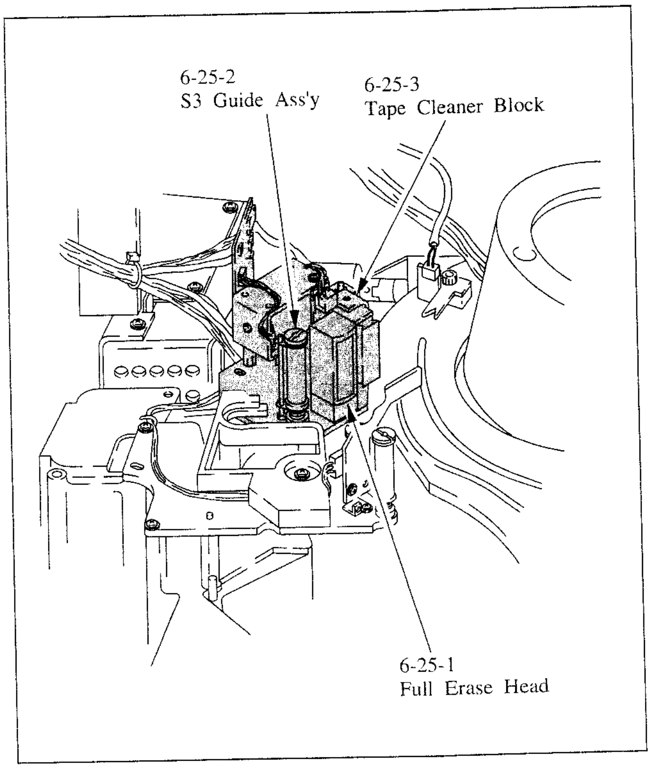


Fig. 6-25-1. FE/TC Ass'y

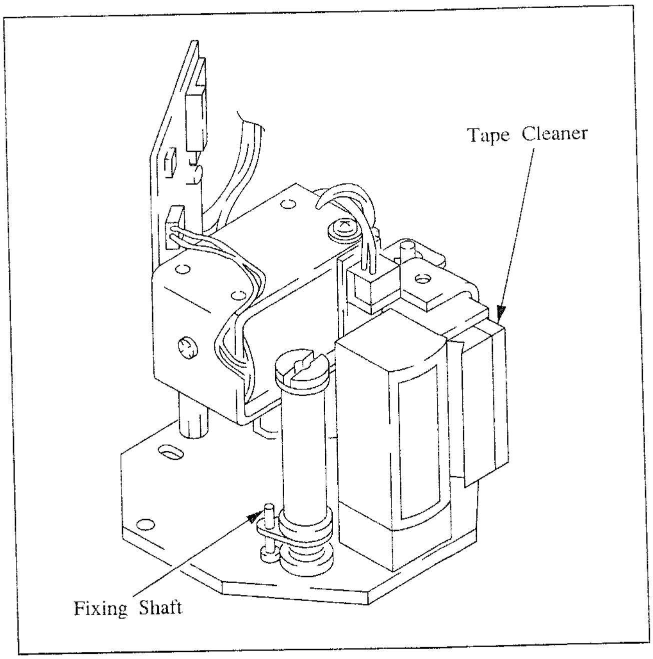


Fig. 6-25-1 (a). FE/TC Ass'y

6-25-1. Full Erase Head Replacement

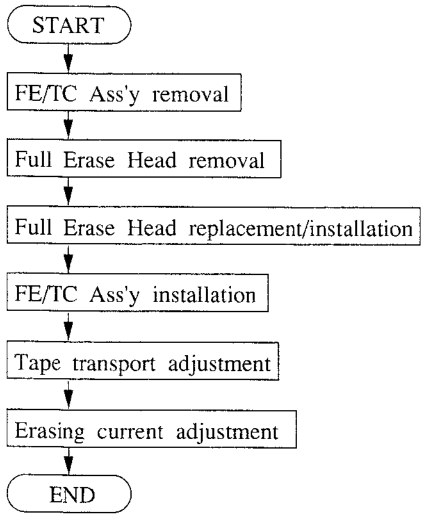
Basic knowledge

A. Remove the FE/TC Ass'y before replacing the Full Erase Head.

B. The shape of the part of the FE/TC Ass'y vary with the serial numbers of the units. But the replacement procedures are all the same. Refer to the Basic Knowledge of Section 6-25 FF/TC ASS'Y REPLACEMENT for details of it.

C. Do not touch the tape touch side at the TC Block.

D. Replacement flowchart


START
FE/TC Ass'y removal
Full Erase Head removal
Full Erase Head replacement/installation
FE/TC Ass'y installation
Tape transport adjustment
Erasing current adjustment
END

Removal

1. FE/TC Ass'y removal (Fig. 6-25-2)
   (1) Disconnect two connectors shown in the figure.
   (2) Remove the screw fixing the FE/TC Ass'y and detach the FE/TC Ass'y.

2. Full Erase Head removal (Fig. 6-25-3)
   (1) Remove the two screws fixing the Full Erase Head and detach the Full Erase Head.
   (2) Using a soldering iron, detach the AH-39 Board from the Full Erase Head.

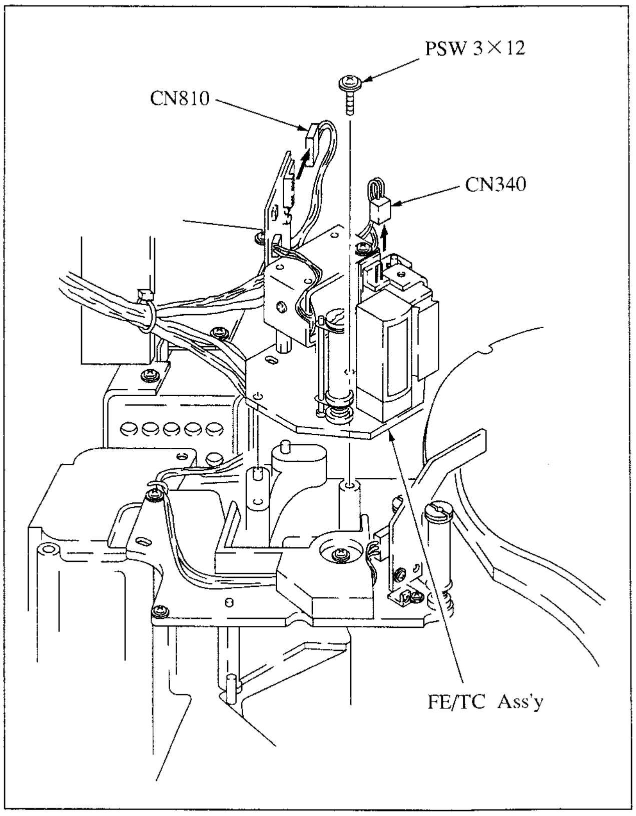

PSW 3×12
CN810
CN340
FE/TC Ass'y

Fig. 6-25-2. FE/TC Ass'y Removal

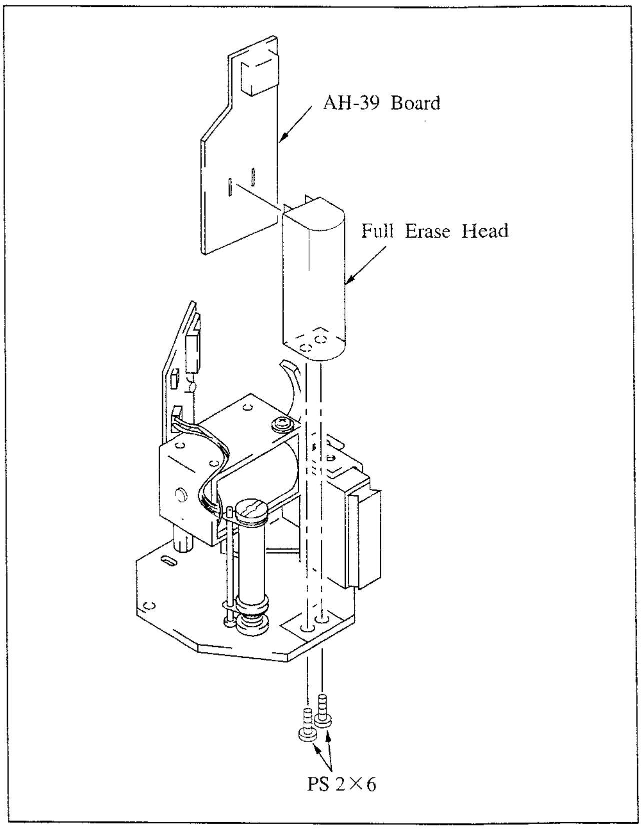

AH-39 Board
Full Erase Head
PS 2×6

Fig. 6-25-3. Full Erase Head Removal

Replacement/Installation

3. Full Erase Head replacement/installation (Fig. 6-25-4)
   (1) Fit the AH-39 Board to the new two pins of the Full Erase Head and solder them together to prevent the AH-39 Board from being lifted from the Full Erase Head.
   (2) Clean the mounting surfaces of the Full Erase Head and FE/TC Base Ass'y with a cloth moistened with cleaning liquid.
   (3) Push the Full Erase Head against the grooves (planes A and B) of the FE/TC Base Ass'y shown in Fig. 1 and fix the Head with the two screws removed in step 2.
   After installation, make sure that there is no gap left between the grooves (planes A and B).
   Tightened torque: 29.4×10^{-2} N·m (3 kgf·cm)

4. FE/TC Ass'y installation
   (1) Clean the mounting surfaces of the Base Plate and FE/TC Ass'y with a cloth moistened with cleaning liquid.
   (2) Reverse the procedure in step 1 to install the FE/TC Ass'y.

Adjustment

5. Tape transport adjustment.
   Refer to Section 9.

6. Erase current adjustment
   Refer to Section 11-8.

7. Play a commercial tape repeatedly and make sure that the Full Erase Head functions normally.

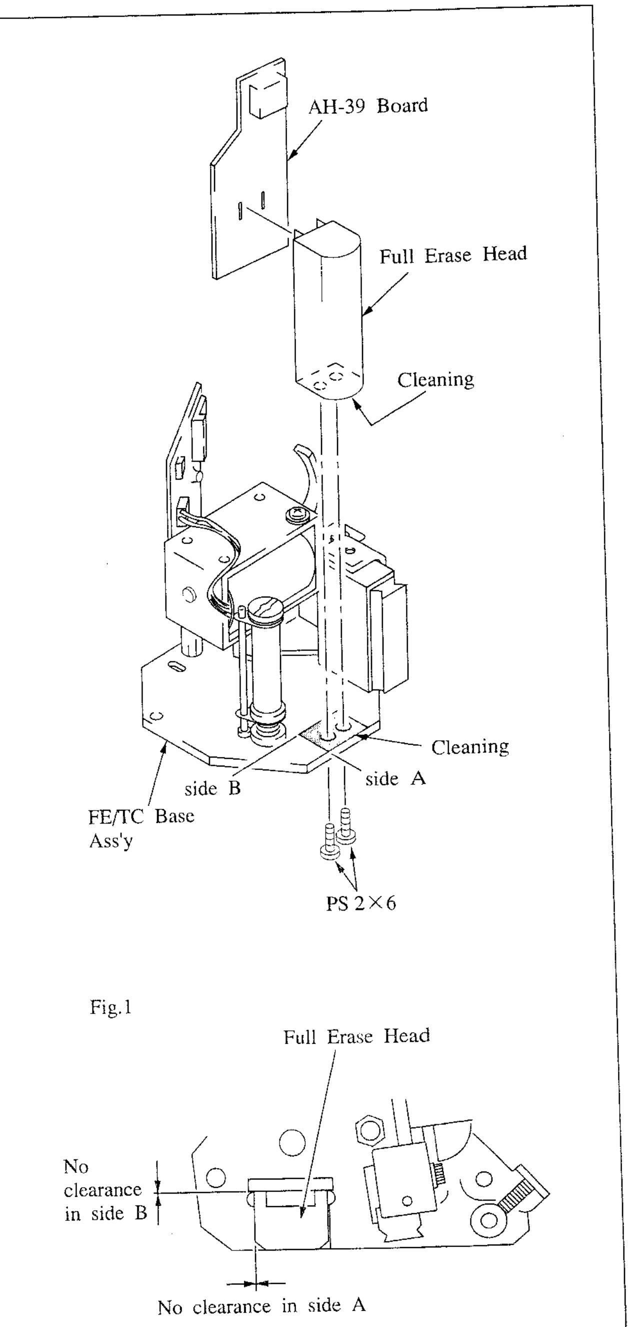

AH-39 Board
Full Erase Head
Cleaning
Cleaning
side A
side B
FE/TC Base Ass'y
PS 2×6
Fig.1
Full Erase Head
No clearance in side B
No clearance in side A

Fig. 6-25-4. Full Erase Head Replacement/Installation

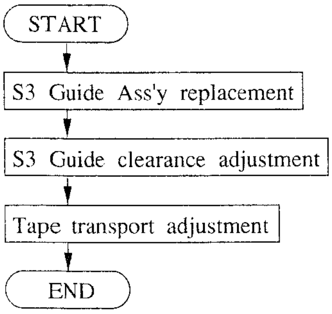
6-25-2. S3 Guide Ass'y Replacement

Basic knowledge

A. The shape of the part of the FE/TC Ass'y vary with the serial numbers of the units. But the replacement procedures are all the same. Refer to the Basic knowledge of Section 6-25 FE/TC ASS'Y REPLACEMENT for details of it.

B. Do not touch the tape touch side at the TC Block.

C. Flow Chart for Replacement


START
S3 Guide Ass'y replacement
S3 Guide clearance adjustment
Tape transport adjustment
END

Replacement

1. S3 Guide Ass'y replacement (Fig. 6-25-5)
   (1) Detach the flange retainer by turning it counterclockwise. The S3 Guide Ass'y can be disassembled as shown in the figure.

   Note : The setscrews attached to the Flange Retainer regulate the height of the S3 Guide. Do not turn the setscrews except when necessary.

   (2) Replace the required components and reassemble them.

   Note : Take care of the following in replacing and reassembling the components of the S3 Guide Ass'y :

   1. When replacing the S3 Guide Ass'y, clean the components with a cleaning piece moistened with cleaning liquid. Then, wipe them two or three times with a dry cloth. Clean also the large and small shafts of the FE/TC Ass'y.
   2. When replacing the setscrew and attaching the Flange Retainer (T), screw the setscrew until the top of the setscrew becomes even with the Flange Retainer (T).
   3. Take care not to drop the spacers (R) into the machine by mistake when the components are replaced.

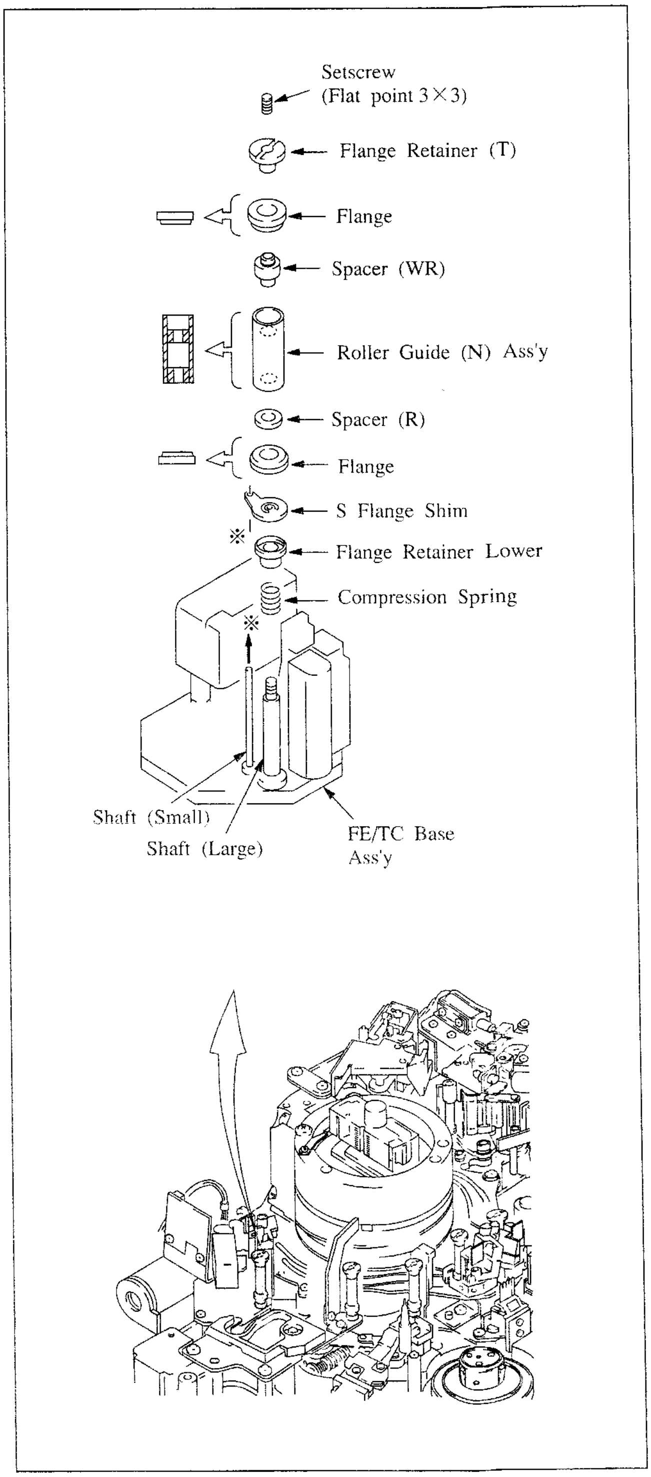

Setscrew
(Flat point 3×3)
Flange Retainer (T)
Flange
Spacer (WR)
Roller Guide (N) Ass'y
Spacer (R)
Flange
S Flange Shim
※
Flange Retainer Lower
Compression Spring
※
Shaft (Small)
Shaft (Large)
FE/TC Base Ass'y

Fig. 6-25-5. S3 Guide Ass'y Replacement

Adjustment

2. S3 Guide clearance adjustment

Note : Remove the FE/TC Ass'y from the machine for adjustment. Take care not to scratch the FE/TC Ass'y and other parts during work.

(1) Remove the FE/TC Ass'y.
Refer to Section 6-25-1.

(2) Do not set the Reference Plate in the machine.
Place it on a smooth surface.

(3) Place the FE/TC Ass'y on the Reference Plate. (Fig. 6-25-6)

Notes1 : Note the screw heads protruding on the bottom of the FE/TC Ass'y when placing the FE/TC Ass'y on the Reference Plate.

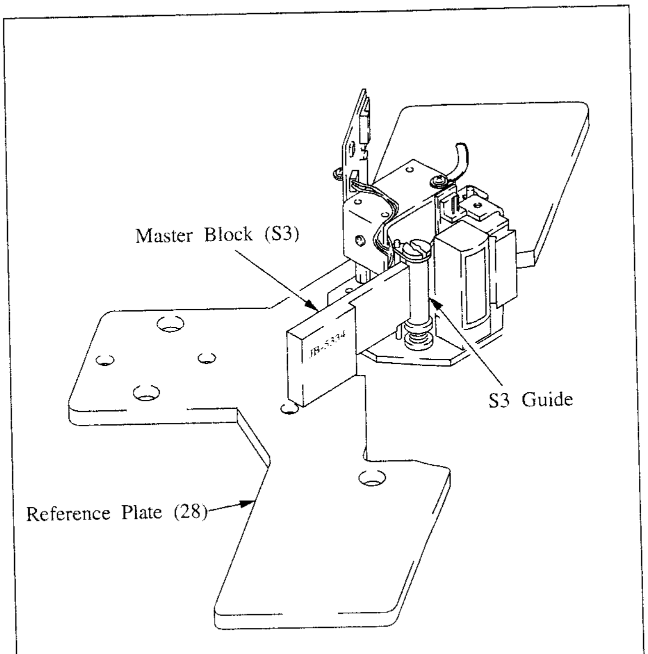
Notes2 : Clean the surface in contact between the FE/TC Ass'y and Reference Plate with a cloth moistened with cleaning liquid.

(4) Place the Master Block (S3) on the Reference Plate as shown in Fig. 6-25-7.

(5) Align the Master Block to the S3 Guide from direction A indicated in Fig 6-25-7, and make sure that the clearance meets the specification below.

Specification : Clearance between the S3 Guide and Master Block (S3) : Up to 0.03 mm

When the specification is satisfied, proceed to step (6).


Master Block (S3)
S3 Guide
Reference Plate (28)

· The Reference Plate must be placed on a smooth surface such as a work bench.

Fig. 6-25-6. S3 Guide Clearance Adjustment (1)

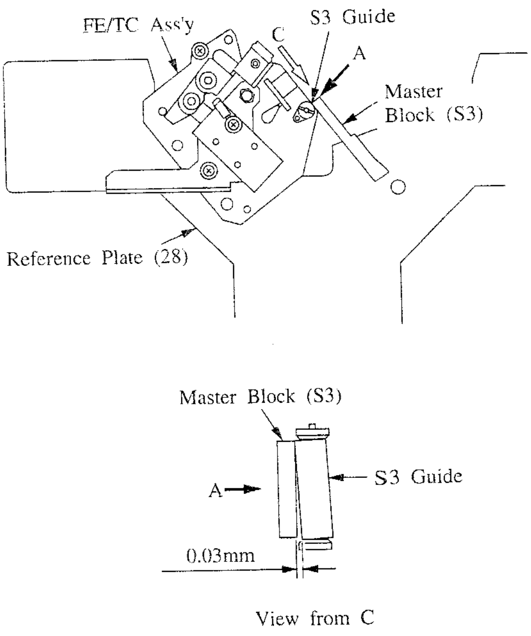

FE/TC Ass'y
C
S3 Guide
A
Master Block (S3)
Reference Plate (28)
Master Block (S3)
A
S3 Guide
0.03mm
View from C

Fig. 6-25-7. S3 Guide Clearance Adjustment (2)

(6) Align the Master Block (S3) to the S3 Guide from direction B as shown in Fig. 6-25-8, and make sure that the clearance in part a (between the S3 Guide lower flange and the tool) meets the specification below.

Specification: No clearance in part a

If the clearance does not meet the specification, make the following adjustment.

(7) Loosen the set screw shown in the figure,and turn the Flange Retainer to fix it within the specification.
(8) Perform the check of step (5) from direction B.
(9) Tighten the setscrew, and make sure that the clearance meets the specification.
(10)When the specification is satisfied, mount the FE/TC Ass'y to the machine.After adjustment, apply a small Locking compound (Screw lock) to the head of the setscrew.

3. Tape transport adjustment
Refer to Section 9.

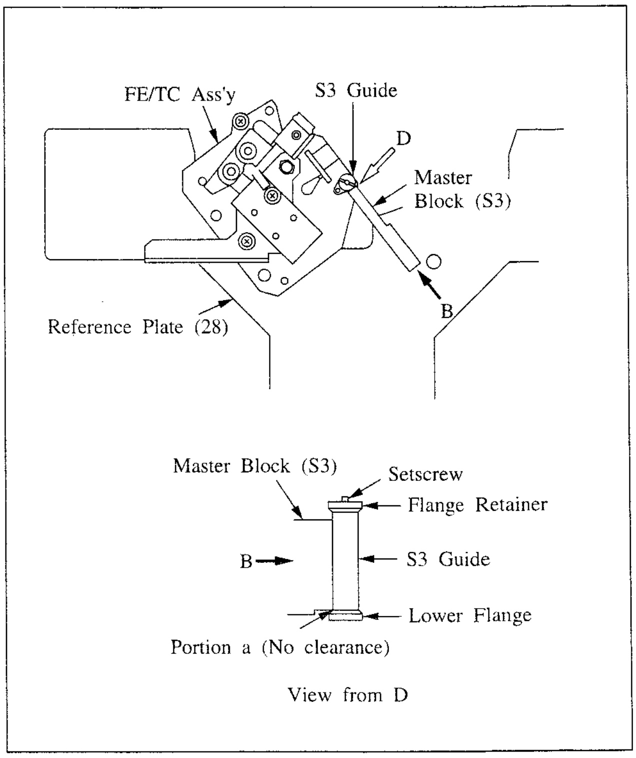

FE/TC Ass'y
S3 Guide
D
Master Block (S3)
B
Reference Plate (28)
Master Block (S3)
Setscrew
Flange Retainer
B
S3 Guide
Lower Flange
Portion a (No clearance)
View from D

Fig. 6-25-8. S3 Guide Clearance Adjustment (3)

6-25-3. Tape Cleaner Block Component Replacement

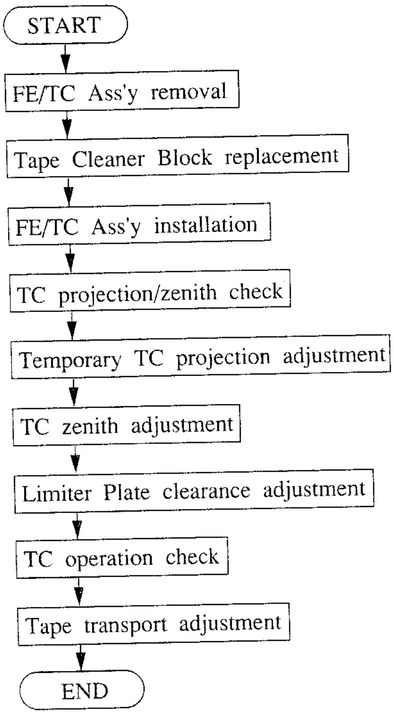
Basic Knowledge

A. The corresponding tape cleaner and tape cleaner operating Portion are called the Tape Cleaner Block in Fig. 6-25-9. The following explains how to replace its components. For details on how to replace the Full Erase Head and S3 Guide Ass'y, see Sections 6-25-1 and 6-25-2 respectively.

B. The shape of the part of the FE/TC Ass'y vary with the serial numbers of the units. But the replacement procedures are all the same. Refer to the Basic Knowledge of Section 6-25 FE/TC ASS'Y REPLACEMENT for details of it.

C. Do not touch the tape touch side at the TC Block.

D. Flowchart for Replacement


START
FE/TC Ass'y removal
Tape Cleaner Block replacement
FE/TC Ass'y installation
TC projection/zenith check
Temporary TC projection adjustment
TC zenith adjustment
Limiter Plate clearance adjustment
TC operation check
Tape transport adjustment
END

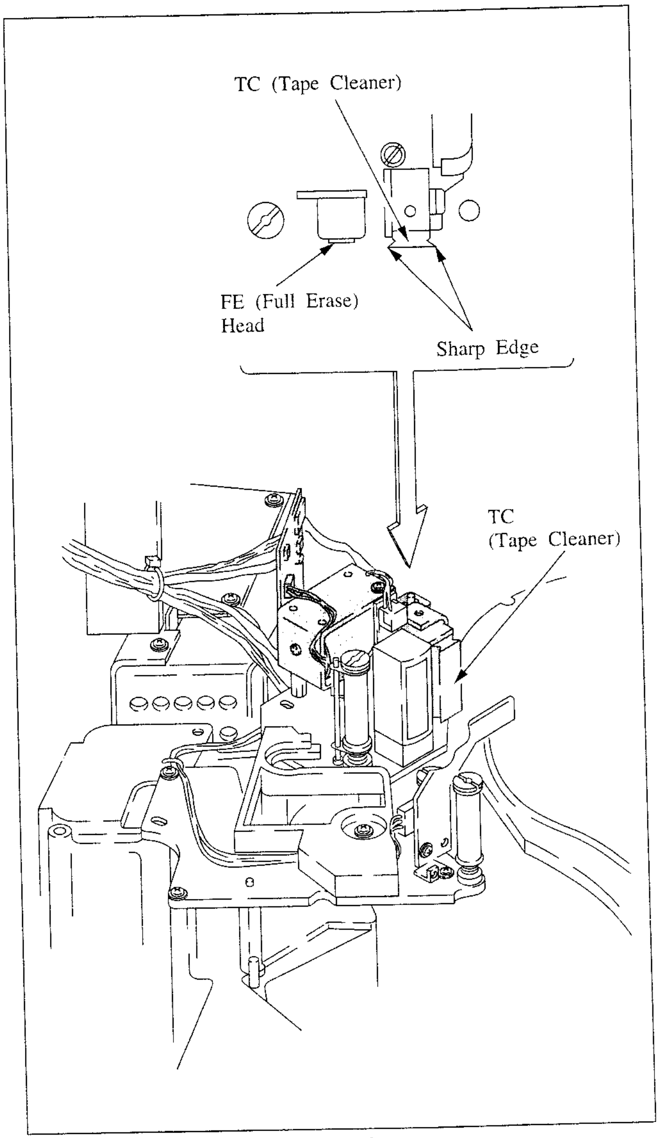

TC (Tape Cleaner)
FE (Full Erase) Head
Sharp Edge
TC (Tape Cleaner)

Fig. 6-25-9. Tape Cleaner Block

Replacement

1. FE/TC Ass'y removal (Fig. 6-25-10)
   (1) Disconnect connectors CN810 and CN340.
   (2) Remove the screw fixing the FE/TC Ass'y and detach the FE/TC Ass'y.

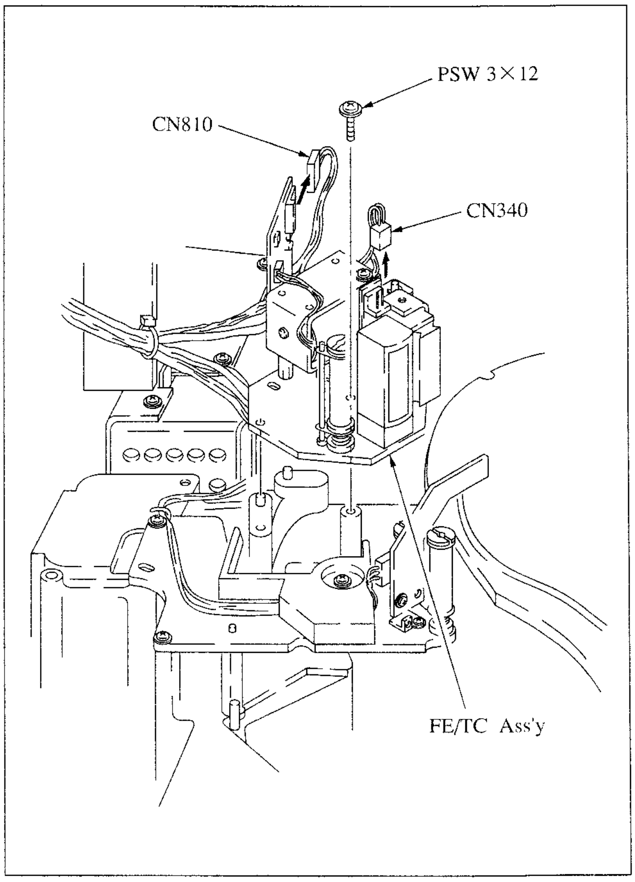

PSW 3×12
CN810
CN340
FE/TC Ass'y

Fig. 6-25-10. FE/TC Ass'y Removal

2. Tape Cleaner Block replacement (Fig. 6-25-11, 12)
   (1) Replace the required components of the Tape Cleaner Block shown in the figure.To replace only the tape cleaner, remove the two screws shown in Fig. 6-25-11.

Notes1 : The edges of the tape cleaner are sharp. Handle the tape cleaner with care.

Notes2 : Take care of the following in replacing the components:
1. Do not cause damage (scratches, etc.) to the surface of the Full Erase Head and the tape traveling surface of the S3 Guide.
2. Before reassembling the Block, clean and smear grease to the portions shown in the figure.

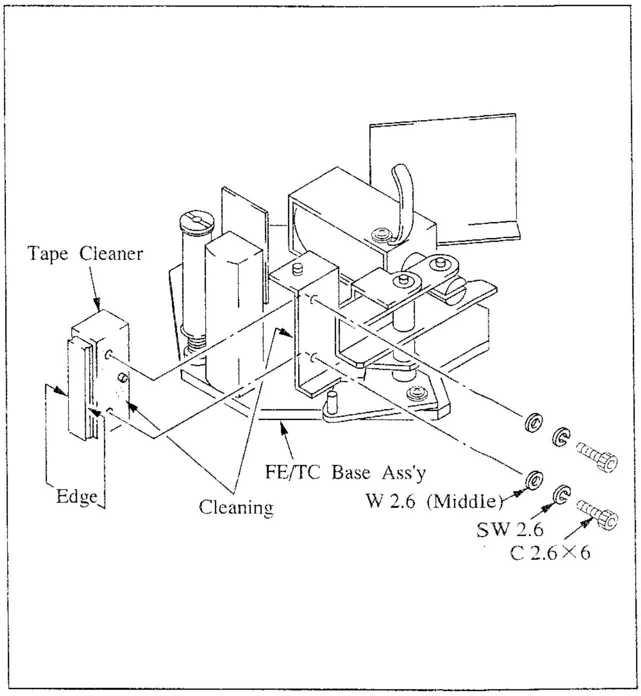
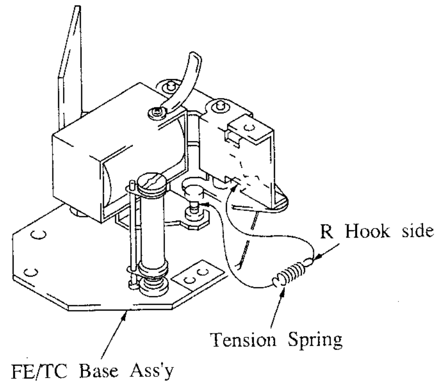

Tape Cleaner
Edge
Cleaning
FE/TC Base Ass'y
W 2.6 (Middle)
SW 2.6
C 2.6×6

Fig. 6-25-11. Tape Cleaner Ass'y Removal

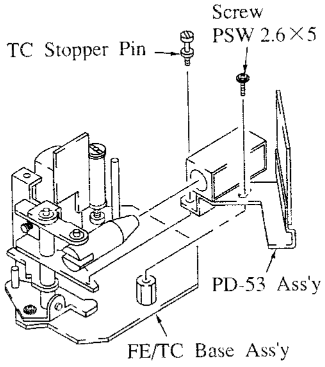
- Assemble the parts in the reverse order

① Tension Spring removal

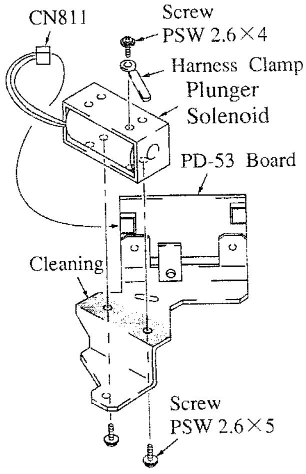

R Hook side
Tension Spring
FE/TC Base Ass'y

Note : It is recommended that you do not reuse a tension spring after it has been detached, and instead exchange it for a new one.

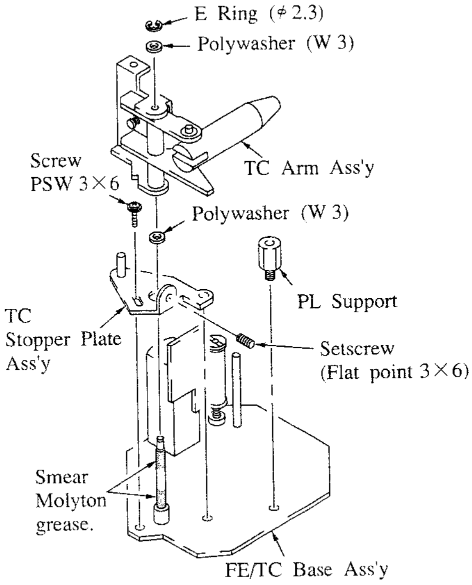
② PD-53 Ass'y removal


Screw
PSW 2.6×5
TC Stopper Pin
PD-53 Ass'y
FE/TC Base Ass'y

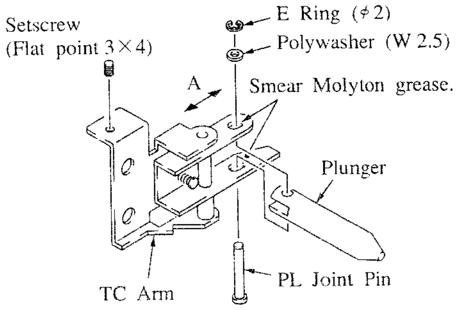
③ Plunger Solenoid removal


CN811
Screw
PSW 2.6×4
Harness Clamp
Plunger
Solenoid
PD-53 Board
Cleaning
Screw
PSW 2.6×5

④ TC Arm Ass'y removal

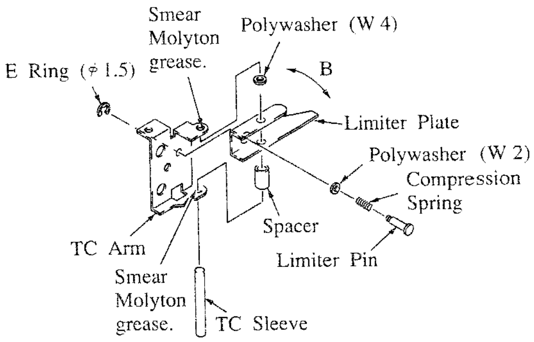

E Ring (φ 2.3)
Polywasher (W 3)
Screw
PSW 3×6
TC Arm Ass'y
Polywasher (W 3)
PL Support
TC
Stopper Plate
Ass'y
Setscrew
(Flat point 3×6)
Smear
Molyton
grease.
FE/TC Base Ass'y

⑤ Plunger removal


Setscrew
(Flat point 3×4)
E Ring (φ 2)
Polywasher (W 2.5)
A
Smear Molyton grease.
Plunger
TC Arm
PL Joint Pin

- After installation, move the Plunger in the direction of arrow A and confirm that it moves smoothly.

⑥ Limiter Plate removal


Smear
Molyton
grease.
Polywasher (W 4)
E Ring (φ 1.5)
B
Limiter Plate
Polywasher (W 2)
Compression
Spring
Spacer
TC Arm
Limiter Pin
Smear
Molyton
grease.
TC Sleeve

- After installation, move the Limiter Plate in the direction of arrow B and confirm that it moves smoothly.

Fig. 6-25-12. Tape Cleaner Block Replacement

3. FE/TC Ass'y installation
   (1) Clean the surface in contact between the standard plate and the FE/TC Ass'y with a cloth moistened with cleaning liquid.
   (2) Reverse the replacement procedure 1 to install the FE/TC Ass'y.

4. Adjustment preparation
   (1) Remove two screws (1) and remove the Tape Protector (S). (Fig. 1 of Fig. 6-25-13)
   (2) Turn on the power and press the keys on the control panel in the order below to set the threading-end state.
   Be hand-operated by turning the Loading Motor as well.
   [BKDV-101]
   TEST , F6 (CHECKER) , F1 (SP)
   F6 (F), 2 , 5 , SET
   Press < and hold it until the threading-end state is set.
   [BKDV-200 series]
   1) SHIFT + SET UP
   2) ENTRY + center key + search dial (or ∨ key) to enter the <TEST> menu. Turn the search dial clockwise or press ∨ key to select 807. [CHECKER MODE].
   3) Press the > key to move the cursor to EXECUTE.
   4) Press the ∧ key to enter CHECKER mode.
   5) Entry F25 by pressing the monitor select keys in the following sequence.
   INPUT CHECK + 5 (F), 2, 5, SET

   F can be input by selecting it the search dial and F1 (ALPH SET) key as well. (Refer to Section 6- (1) - 4.)

   6) Press < and hold it until the threading-end state is set.

   (3) Turn off the power.
   (4) Turn the Limiter Plate to the direction indicated by the arrow, and insert the Stopper Pin into the hole shown in the figure (Fig. 2 of Fig. 6-25-13)

   Know how: Hold it to the hole using Vinyl tape.

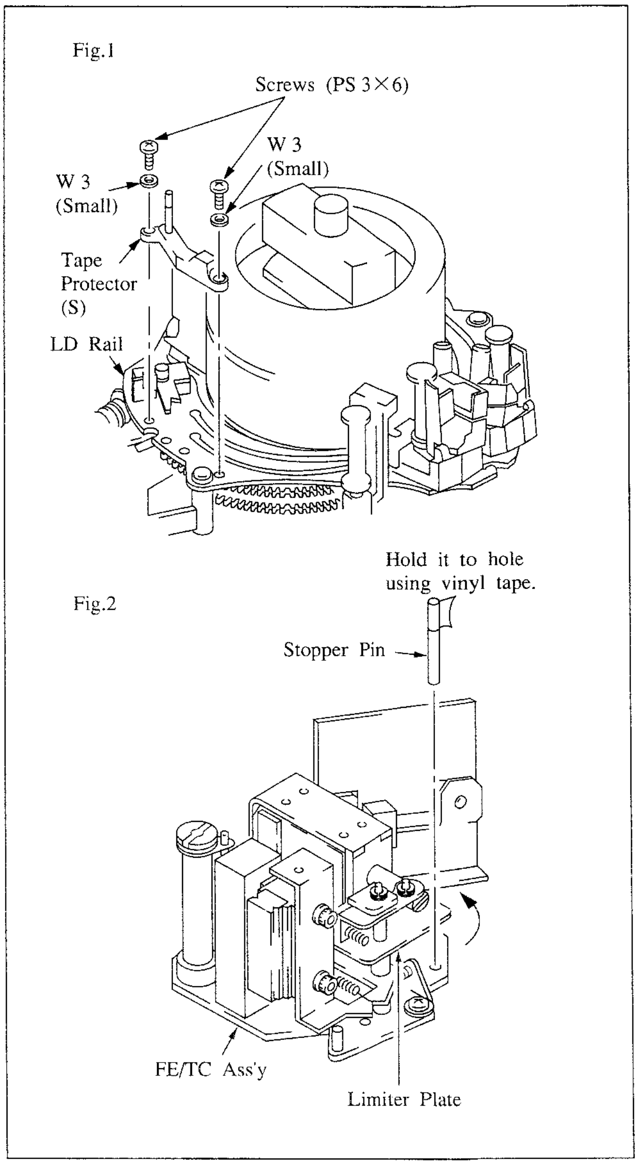


Fig. 6-25-13 Adjustment Preparation (1)

(5) Clean the tape travel surface of the Tape Cleaner Adjustment Plate in contract with the full erase head and S2 Guide with a cleaning piece moistened with cleaning liquid. After that, wipe it two or three times with a dry cloth.

(6) Set the Tape Cleaner Adjustment Plate as shown in Fig. 6-25-14.

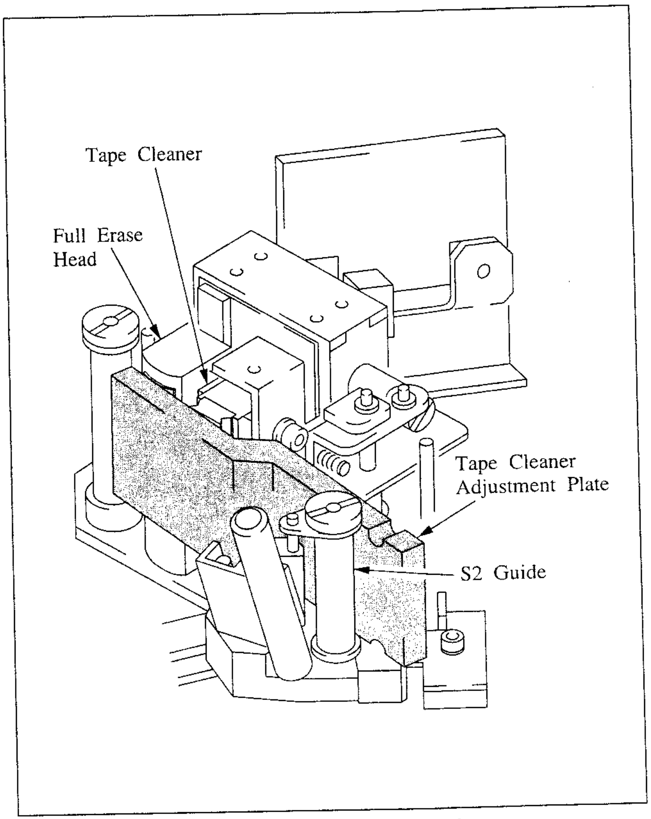

Tape Cleaner
Full Erase Head
Tape Cleaner Adjustment Plate
S2 Guide

Fig. 6-25-14 Adjustment Preparation (2)

Adjustment

5. TC projection/zenith check (Fig. 6-25-15)
   - Make a visual check on clearances A and B shown in the figure :

     Specifications : TC projection : $0 < A < 0.03$ mm
     TC zenith : $-0.01 < B < 0.01$ mm

     If these specifications are met, proceed to step 8. Otherwise, proceed to step 6.

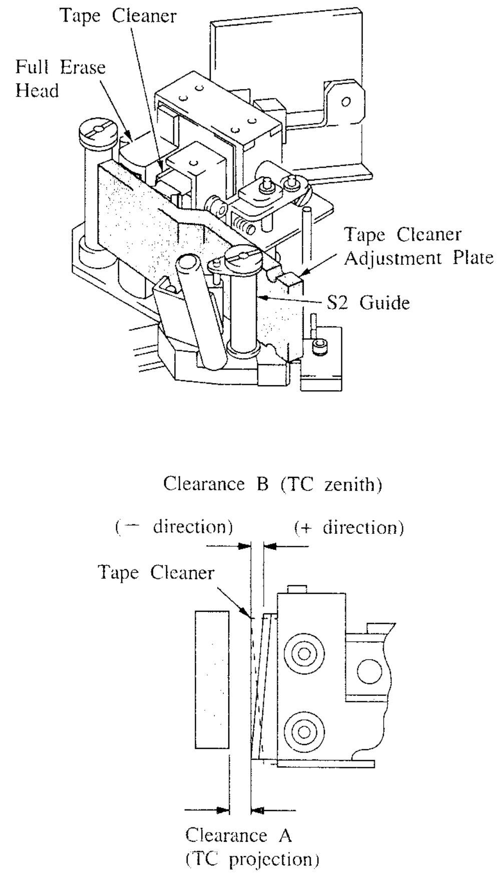

Tape Cleaner
Full Erase Head
Tape Cleaner Adjustment Plate
S2 Guide
Clearance B (TC zenith)
(− direction)
(+ direction)
Tape Cleaner
Clearance A
(TC projection)

Fig. 6-25-15. TC Projection/Zenith Check

6. Temporary TC projection adjustment
   (1) Loosen the fixing screw ⓐ shown in Fig. 6-25-16 and then temporarily tighten it.
   (2) Adjust the TC Ass'y in the directions of arrows A and B by turning the adjustment screw ⓐ.

   Note : When the adjustment screw ⓐ is turned clockwise, the TC Ass'y moves in the direction of arrow A. To adjust the TC Ass'y in the direction of arrow B, loosen the adjustment screw ⓐ once, and then move the Stopper Plate in the detection C and adjust the TC Ass'y in the direction of arrow A.

   (3) Make adjustments so that clearance D (Fig. 6-25-17) between the tape cleaner adjustment plate and the TC Ass'y should meet the specification below:

   Specification of D: 0.01 < D < 0.1 mm

   (4) Tighten the fixing screw ⓐ.

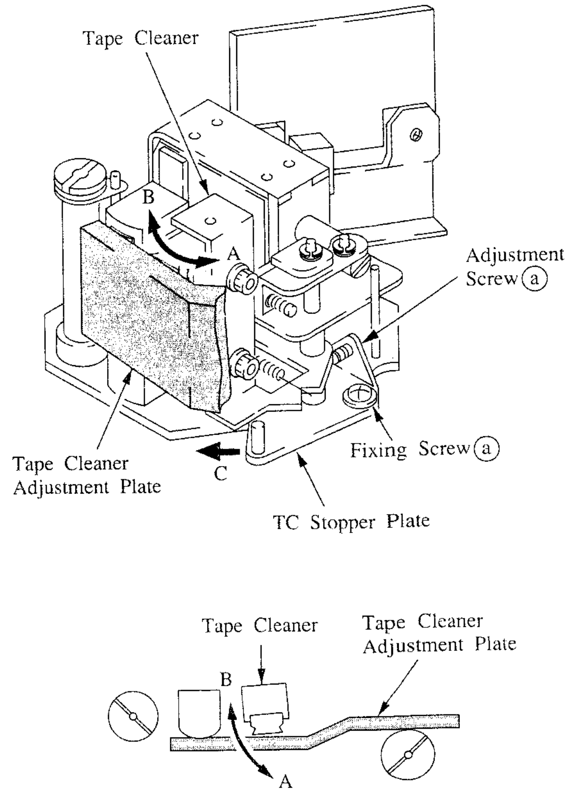

Tape Cleaner
B
A
Adjustment Screw ⓐ
Fixing Screw ⓐ
Tape Cleaner Adjustment Plate
C
TC Stopper Plate
Tape Cleaner
Tape Cleaner Adjustment Plate
B
A

Fig. 6-25-16. TC Projection Temporary Adjustment(1)

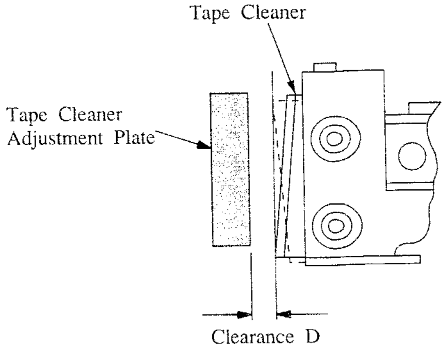

Tape Cleaner
Tape Cleaner Adjustment Plate
Clearance D

Fig. 6-25-17. TC Projection Temporary Adjustment (2)

7. TC zenith adjustment
   (1) Loosen the two fixing screws ⓑ shown in the figure, then temporarily tighten them.

   (2) Turn adjustment screw ⓑ to adjust the TC zenith so that the specifications for clearances A and B in step 5 are satisfied.If the projection position does not satisfy the specification, perform temporary TC projection adjustment (step 6) again. The table below shows the relation between turning directions of adjustment screw ⓑ and TC zenith.

Adjusting screw b	TC flapping direction
Clockwise	Direction D
Counterclockwise	Direction E

Notes1 : To adjust the Tape Cleaner in direction E, loosen adjustment screw ⓑ. Turn the Tape Cleaner in direction E by hand, and readjust it in direction D.

Notes2 : Both sides of the Tape Cleaner have sharp edges. Handle the Tape Cleaner with care. Do not touch the sharp edges with bare hands.

   (3) Make a visual adjustment so that clearance B shown in the figure meets the specification.

   Specification: TC zenith : $-0.01 < B < 0.01$mm

   (4) Make adjustments while repeating steps 6 and 7 so that the projection or zenith of the Tape Cleaner meets the specifications of step 5.

   Specifications : TC projection: 0 to 0.03 mm
   TC zenith: −0.01 to 0.01 mm

   (5) Tighten the two fixing screws ⓑ .
   (6) Make sure that the specifications are satisfied. Otherwise, repeat from step 6.
   (7) Apply a small amount of Locking compound (Screw lock) to the head of fixing screws ⓐ and ⓑ, and also of adjustment screws ⓐ and ⓑ .

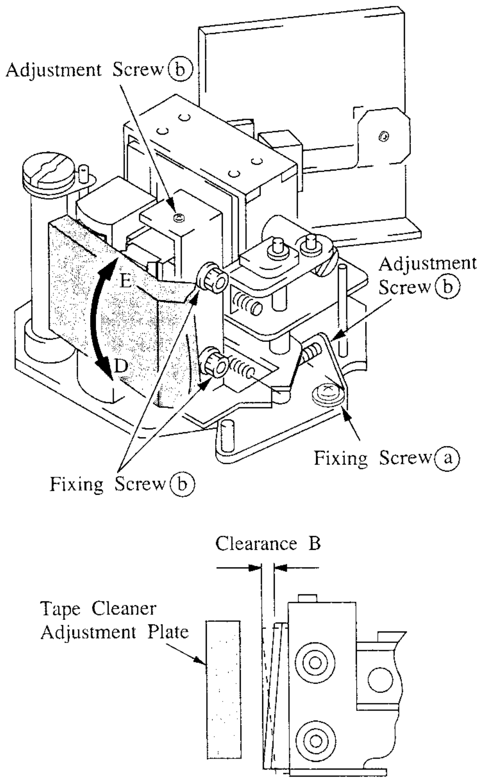


Fig. 6-25-18. TC Zenith Adjustment

8. Limiter Plate clearance adjustment
   (1) Remove the Tape Cleaner Adjusting Plate and Stopper Pin mounted in Step 4.
   (2) Press the plunger shown in the figure in the direction indicated by arrow D, and hold it.
   (3) Visually make sure that clearance E between the Limiter Plate and the TC arm meets the specification below.

   Specification : E : almost parallel

   If the specification is met, proceed to step 9.
   Otherwise, proceed to step (4)

   (4) Loosen screws a and b shown in the figure by 90° to 180°.
   (5) Make adjustments by turning the Plunger Ass'y in the direction indicated by arrow F so that the specification is met.
   (6) Tighten screws a and b.
   (7) Perform step 6 and subsequent steps to make sure of the projection or zenith.

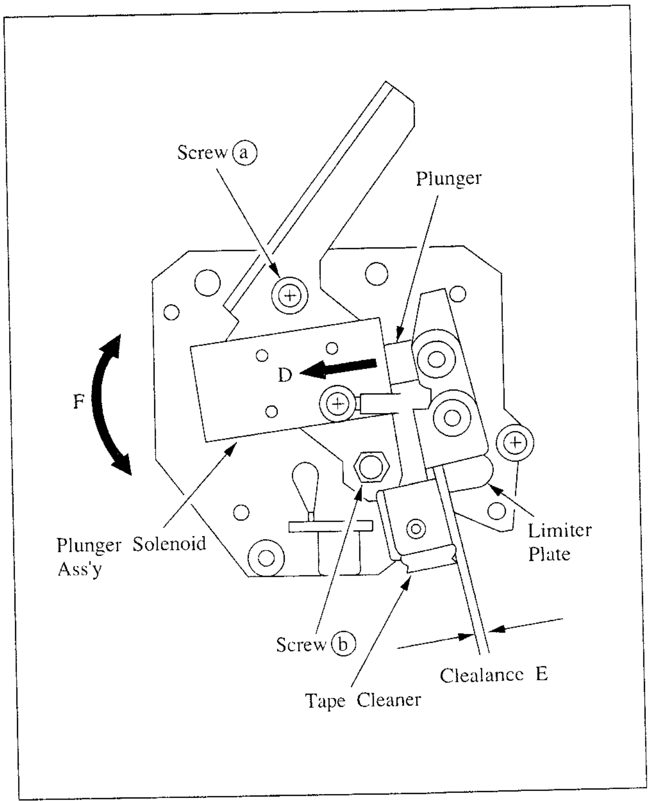


Fig. 6-25-19 Limiter Plate Clearance Adjustment

9. Mount the Tape Protector (S) removed in step 4.

10. Clean the FE head and TC tape travel surface with a cleaning piece moistened with cleaning liquid. Then, wipe them two or three times with a dry cloth.

11. TC operation check
    (1) Turn on the power.
    (2) Insert a normal tape.
    (3) Check the following items in REC or PLAY mode.
    - TC touches the tape.
    - Tape travels normally.

    If the above items are not satisfied, recheck the TC projection position or zenith. (Refer to step 4.)

12. Tape transport adjustment
    Refer to Section 9.

6-26. PINCH ROLLER PRESS BLOCK REPLACEMENT

Basic Knowledge

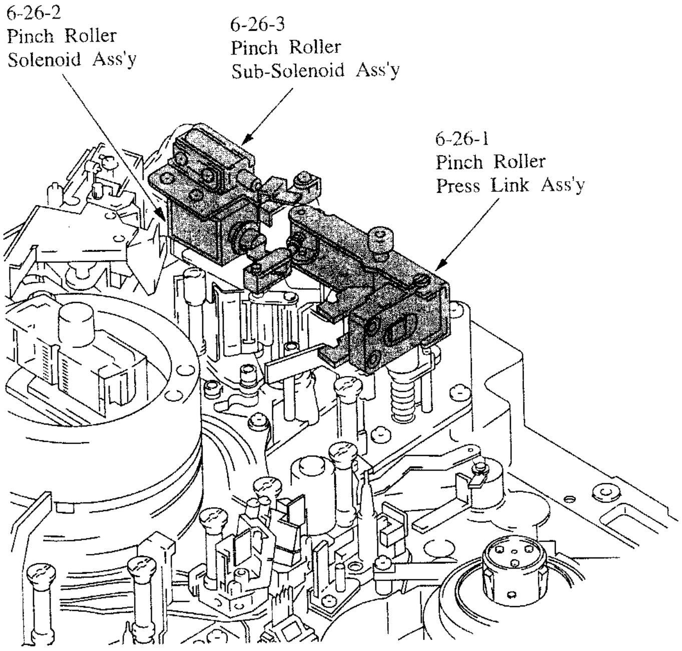
A. Fig. 6-26-1 shows the Pinch Roller Press Block.
The replacement methods are explained in the following order.

6-26-1. Pinch Roller Press Link Ass'y Components Replacement
6-26-2. Pinch Roller Solenoid Ass'y Replacement
6-26-3. Pinch Roller Sub-Solenoid Replacement

B. Some parts of Pinch Roller Solenoid Ass'y, Pinch Roller Sub-Solenoid Ass'y and Pinch Roller Press Link Ass'y were changed on the following sets. But the replacement procedures and adjustment procedures were all the same.

DVR-28 (UC) : S/N 12501 and higher
DVR-28P (UC) : S/N 11903 and higher
DVR-28P (EK) : S/N 12001 and higher
DVR-P28 (UC) : S/N 10401 and higher

C. Prepare the following materials.
- Thickness gauge
  Sony Parts No.: J-6041-670-A
- Molyton grease (No. 320)
  Sony Parts No.: 7-662-001-41
- Pinch Roller Check Tool
  Sony Parts No.: J-6253-750-A
- Pinch Roller Adjustment Tool
  Sony Parts No.: J-6251-210-A



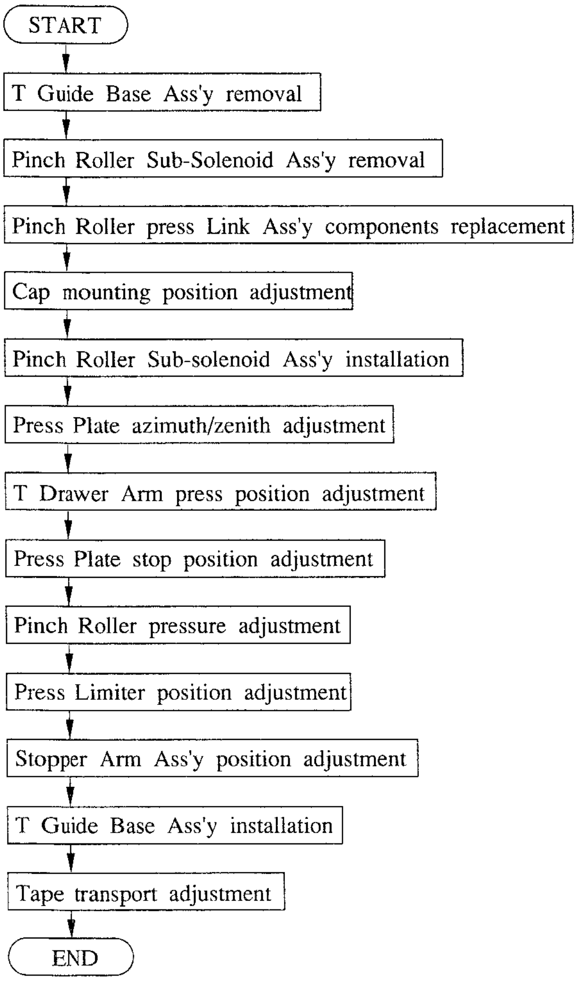
(This illustration is DVR-28)

Fig. 6-26-1 Pinch Roller Press Block

6-26-1. Pinch Roller Press Link Ass'y Components Replacement

Basic Knowledge

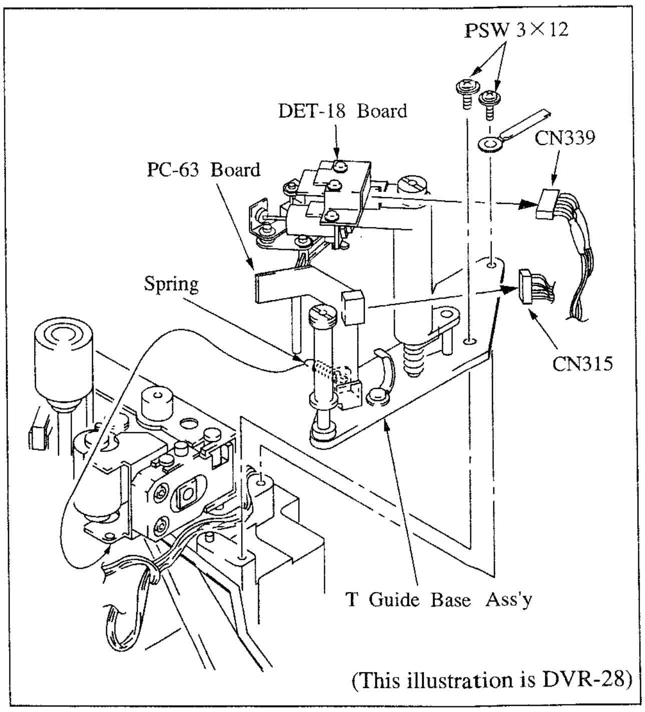
- Replacement flowchart


START
T Guide Base Ass'y removal
Pinch Roller Sub-Solenoid Ass'y removal
Pinch Roller press Link Ass'y components replacement
Cap mounting position adjustment
Pinch Roller Sub-solenoid Ass'y installation
Press Plate azimuth/zenith adjustment
T Drawer Arm press position adjustment
Press Plate stop position adjustment
Pinch Roller pressure adjustment
Press Limiter position adjustment
Stopper Arm Ass'y position adjustment
T Guide Base Ass'y installation
Tape transport adjustment
END

Replacement

1. T Guide Base Ass'y removal (Fig. 6-26-2)
   (1) Disconnect the connector on each board shown in the drawing and detach the T Guide Base Ass'y from the wiring stopper.
   (2) Detach the hook of the spring Press Link side shown in the drawing.
   (3) Remove the two screws and remove the T Guide Base Ass'y.

Note : When remove the spring, not change its figure.


PSW 3×12
DET-18 Board
CN339
PC-63 Board
Spring
CN315
T Guide Base Ass'y

(This illustration is DVR-28)

Fig. 6-26-2 T Guide Base Ass'y Removal

2. Pinch Roller Sub-Solenoid Ass'y removal
   Refer to Section 6-26-3.
3. Pinch Roller Press Link Ass'y replacement
   (1) Loosen the setscrews attached to the cap by turning them once or twice and detach the cap as shown in Fig. 6-26-3.
   Hexagon wrench key: 1.5 mm in width across flats
   (2) Detach the E-ring fixing the Link Pin Ass'y.
   Remove the screw (P 2.6x5) with ※5 mark, and remove the Pin Support Plate and Link Pin on the following sets. (Fig. 6-26-3)

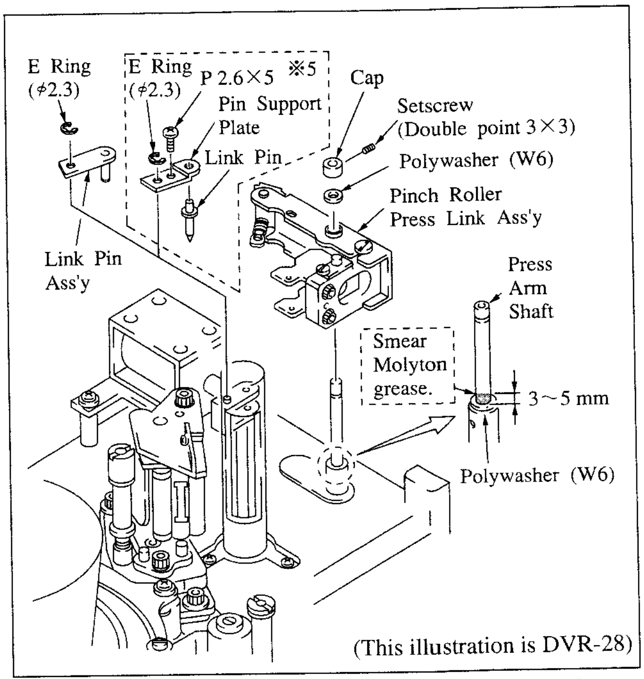
DVR-28 (UC)	: S/N 12501 and higher
DVR-28P (UC)	: S/N 11903 and higher
DVR-28P (EK)	: S/N 12001 and higher
DVR-P28 (UC)	: S/N 10401 and higher

   (3) Detach the Pinch Roller Press Link Ass'y from the machine.
   (4) Replace the required components of the Pinch Roller Press Link Ass'y shown in Fig. 6-26-4.

Note1: Before replacement, clean the mounting surfaces and the press arm shaft of the respective components.

Note2: The Spring Spacer was changed to the washer with ※5 mark on the following sets.

DVR-28 (UC)	: S/N 12501 and higher
DVR-28P (UC)	: S/N 11903 and higher
DVR-28P (EK)	: S/N 12001 and higher
DVR-P28 (UC)	: S/N 10401 and higher


E Ring (φ2.3)
E Ring (φ2.3)
P 2.6×5 ※5
Pin Support Plate
Link Pin
Cap
Setscrew (Double point 3×3)
Polywasher (W6)
Pinch Roller Press Link Ass'y
Link Pin Ass'y
Press Arm Shaft
Smear Molyton grease.
3~5 mm
Polywasher (W6)

(This illustration is DVR-28)

Fig. 6-26-3 Pinch Roller Press Arm Ass'y Removal

5) Smear a very small amount of Molyton grease to the five locations shown in Fig. 6-26-3 (one location) and Fig. 6-26-4 (four locations).

(6) Install the Pinch Roller Press Link Ass'y by reversing the procedures of steps 2 and 3.

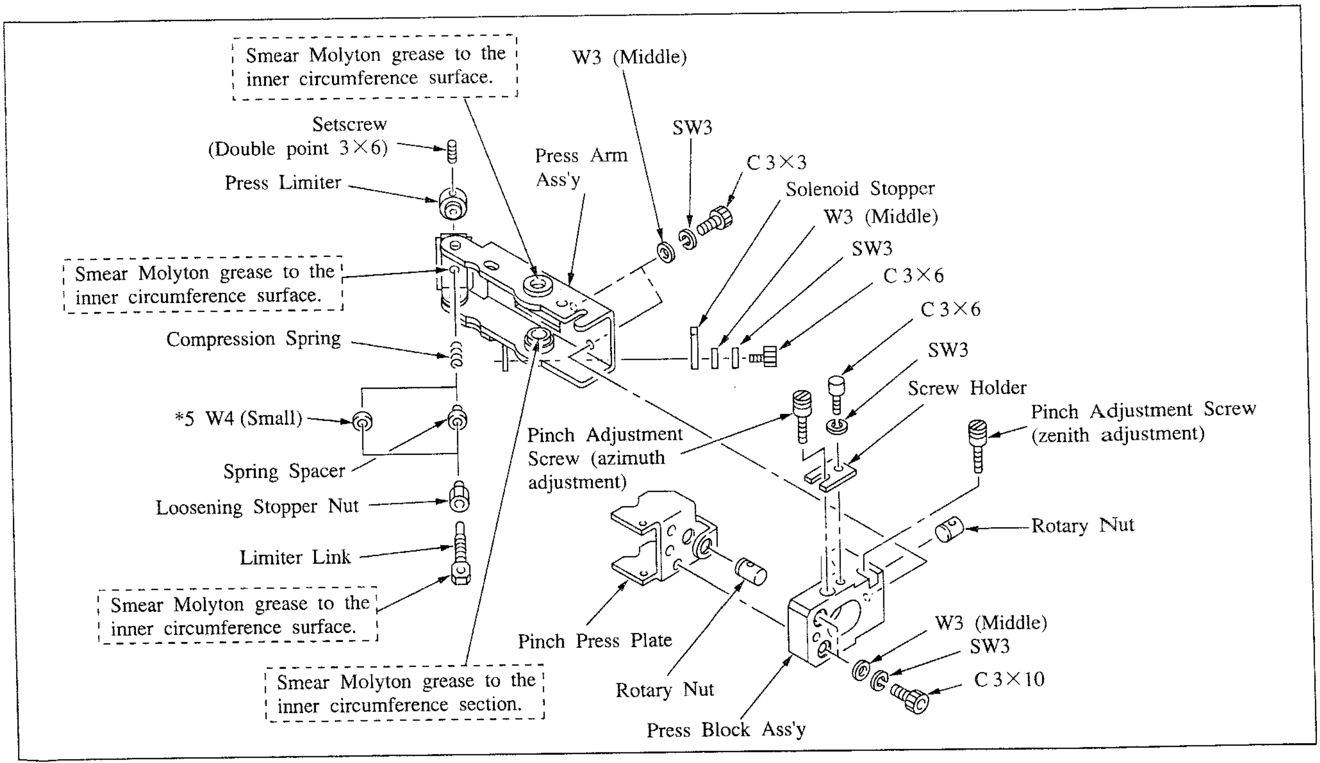

Smear Molyton grease to the inner circumference surface.
W3 (Middle)
Setscrew (Double point 3×6)
Press Limiter
Press Arm Ass'y
SW3
C 3×3
Solenoid Stopper
W3 (Middle)
SW3
C 3×6
C 3×6
SW3
Smear Molyton grease to the inner circumference surface.
Compression Spring
Screw Holder
*5 W4 (Small)
Pinch Adjustment Screw (azimuth adjustment)
Pinch Adjustment Screw (zenith adjustment)
Spring Spacer
Loosening Stopper Nut
Rotary Nut
Limiter Link
Smear Molyton grease to the inner circumference surface.
Pinch Press Plate
W3 (Middle)
SW3
C 3×10
Rotary Nut
Smear Molyton grease to the inner circumference section.
Press Block Ass'y

Fig. 6-26-4 Pinch Roller Press Link Ass'y Components

Adjustment

4. Cap mounting position adjustment (Fig. 6-26-5)
   (1) Insert a thickness gauge (0.05 mm in thickness) between the washer and the cap shown in the drawing, and tighten the setscrews.

   Hexagonal wrench : across flats of 1.5 mm

   (2) Remove the thickness gauge (0.05 mm in thickness) and attempt to insert another thickness gauge (0.07 mm in thickness) instead. Make sure that the latter does not fit into the same clearance.
   (3) Make sure that the Pinch Roller Press Arm Ass'y moves smoothly.

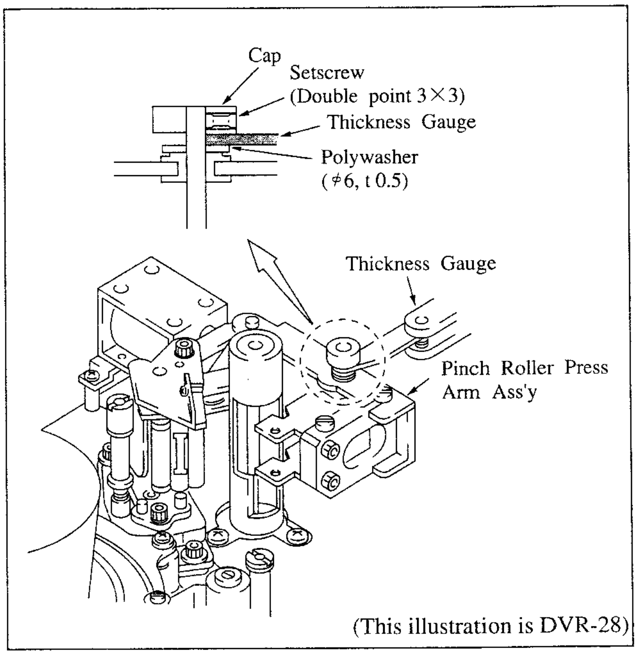

Cap
Setscrew
(Double point 3×3)
Thickness Gauge
Polywasher
(φ6, t 0.5)
Thickness Gauge
Pinch Roller Press Arm Ass'y
(This illustration is DVR-28)

Fig. 6-26-5 Cap Mounting Position Adjustment

5. Pinch Roller Sub-Solenoid Ass'y installation
   Refer to Section 6-26-3.

6. Press Plate azimuth/zenith adjustment

Preparation

- Locate the unthreading-end by turning the Worm Gear of the Loading Motor in the direction of arrow B as shown in Fig. 6-26-6.

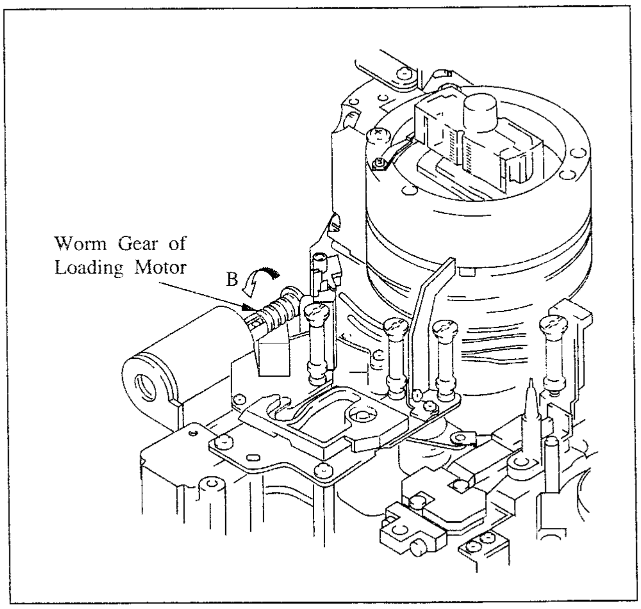

Worm Gear of Loading Motor
B

Fig. 6-26-6 Worm Gear of the Loading Motor

Adjustment

(1) Clean the Capstan Motor Shaft and the mounting surface (2 V-shaped grooves) of the Pinch Roller Check Tool with a cloth moistened with cleaning liquid.

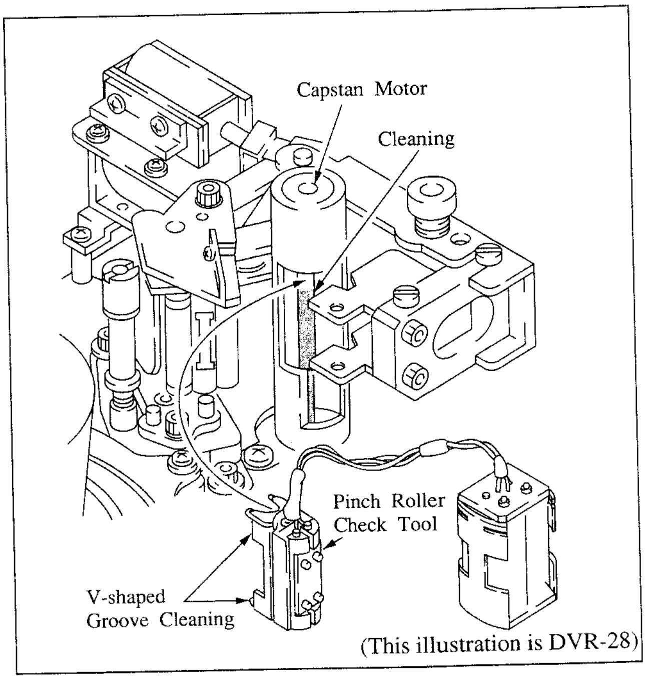

Capstan Motor
Cleaning
Pinch Roller Check Tool
V-shaped Groove Cleaning
(This illustration is DVR-28)

Fig. 6-26-7 Cleaning

(2) Insert the tool onto the Capstan Motor Shaft shown in Fig. 6-26-8.

Note : Once the tool is attached to the Capstan Motor Shaft, do not move it in the directions of arrows A and B (vertical).

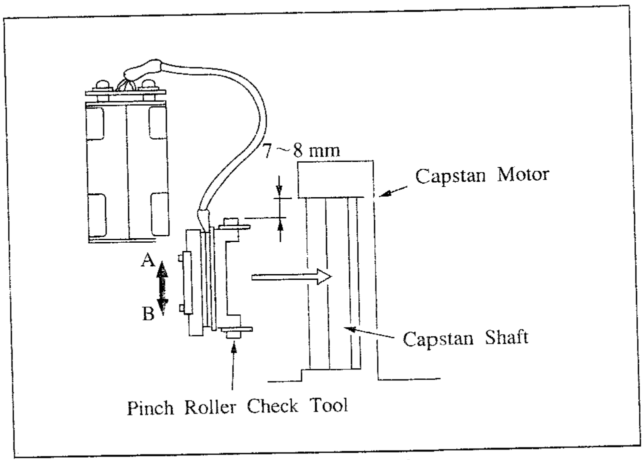
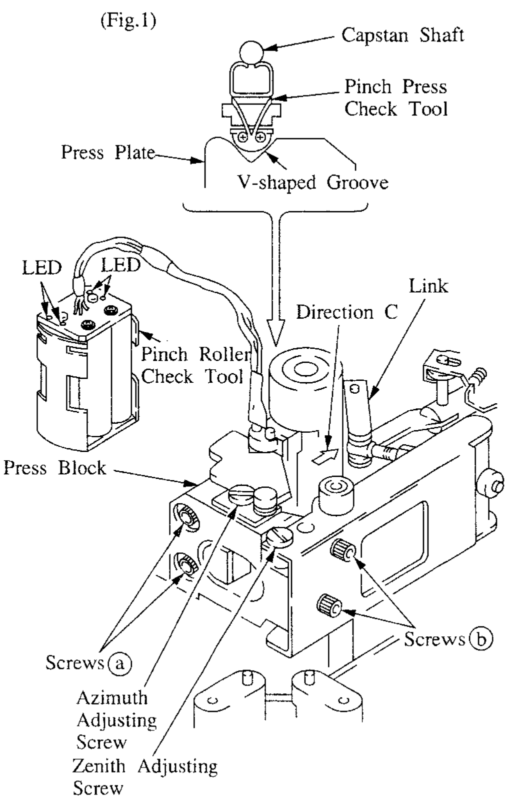

7 ~ 8 mm
Capstan Motor
A
B
Capstan Shaft
Pinch Roller Check Tool

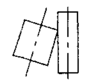
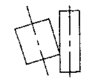
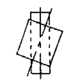
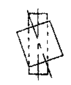
Fig. 6-26-8 Pinch Roller Check Tool

(3) Loosen the four screws ⓐ and ⓑ by turning them by one-quarter to one-half turn and then temporarily fix them with a tightening torque of approx 39.2×10^{-2} N·m (4 kgf·cm).
Hexagonal wrench : 2.5 mm in width across flats
(4) Mate the Pinch Roller Check Tool with the V-shaped grooves of the Press Plate as shown in Fig. 1.
(5) Push the Link ahead in the direction of arrow C.Adjust the azimuth adjusting screw and zenith adjusting screw so that the four LED lamps on the Pinch Roller Check Tool go ON at the same time according to the drawing.

Note : When an adjustment is to be made from an LED OFF state by turning the zenith adjusting screw, stop turning the screw as soon as the LEDs go ON. Excessive turning of the screw may lead to a deviation in zenith in the opposite direction. If this occurs, make an adjustment by turning the zenith adjusting screw in the opposite direction.

(6) Strongly push the Link in the direction of arrow C. Make sure that at least three of the four LEDs on the Pinch Roller Check Tool go ON at the same time.
(7) Tighten the four screws ⓐ and ⓑ.
Tightening torque : 78.4×10^{-2} N·m (8 kgf·cm)
Then turn the azimuth adjusting screw and zenith adjusting screw by 60° to loosen them.
(8) Retry the above confirmation when the Link is pushed in the direction of arrow C under the following conditions:
When softly pushed : The four LEDs go ON at the same time.
When strongly pushed : At least three of the four LEDs go ON at the same time.
(9) When the conditions set at step 8 above are not satisfied, retry from step 3.
(10) Detach the Pinch Roller Check Tool from the Capstan Shaft taking care to avoid damage to the Capstan Shaft. First pull the lower part and then pull the upper part.



	LEDs indication	Direction of turning the azimuth adj. screw	Direction of turning the zenith adj. screw	Shaft Capstan and Pinch Roller
1	Green Green -ф- -ф- o o	—	Left	
2	o o -ф- -ф- Red Red	—	Right	
3	Green -ф- o o -ф- Red	Rigth	—	
4	Green o -ф- -ф- o Red	Left	—	
5	Green Green -ф- -ф- -ф- o Red	Left	Left	Same as 1 and 4
6	Green o -ф- -ф- -ф- Red Red	Left	Rigth	Same as 2 and 4

▯ : Capstan shaft ▯ : Pinch roller

Fig. 6-26-9 Press Plate Azimuth/Zenith Adjustment

7. T Drawer Arm press position adjustment

Preparation

- When the Arm is in an unthreading-end state, turn the Worm Gear of the Loading Motor shown in Fig. 6-26-10 by hand in the direction of arrow A to locate the threading-end.

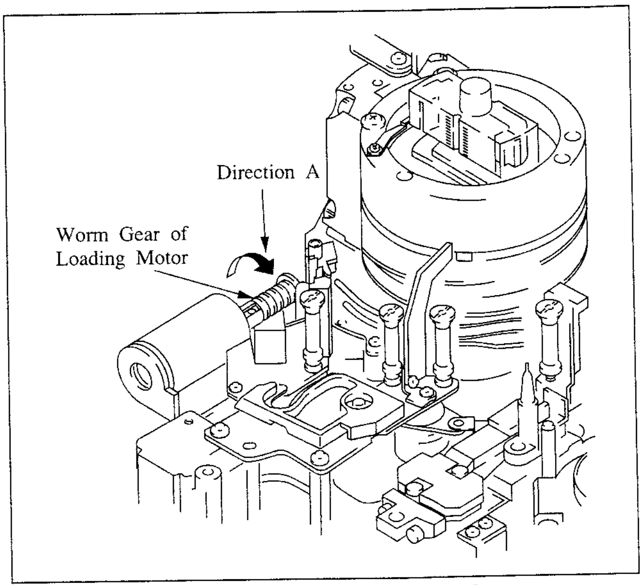

Direction A
Worm Gear of Loading Motor

Fig. 6-26-10 Worm Gear of the Loading Motor

(1) Push the Stopper Ass'y of the Pinch Roller Sub-solenoid Ass'y to the end in the direction of arrow C to fix the solenoid pin.

Note1: The state of (1) must be maintained when steps (2) through (6) are carried out.

Note2: The Pinch Roller Sub-Solenoid Ass'y was changed to it with ※5 mark on the following sets. (Fig.6-26-11)

DVR-28 (UC) : S/N 12501 and higher
DVR-28P (UC) : S/N 11903 and higher
DVR-28P (EK) : S/N 12001 and higher
DVR-P28 (UC) : S/N 10401 and higher

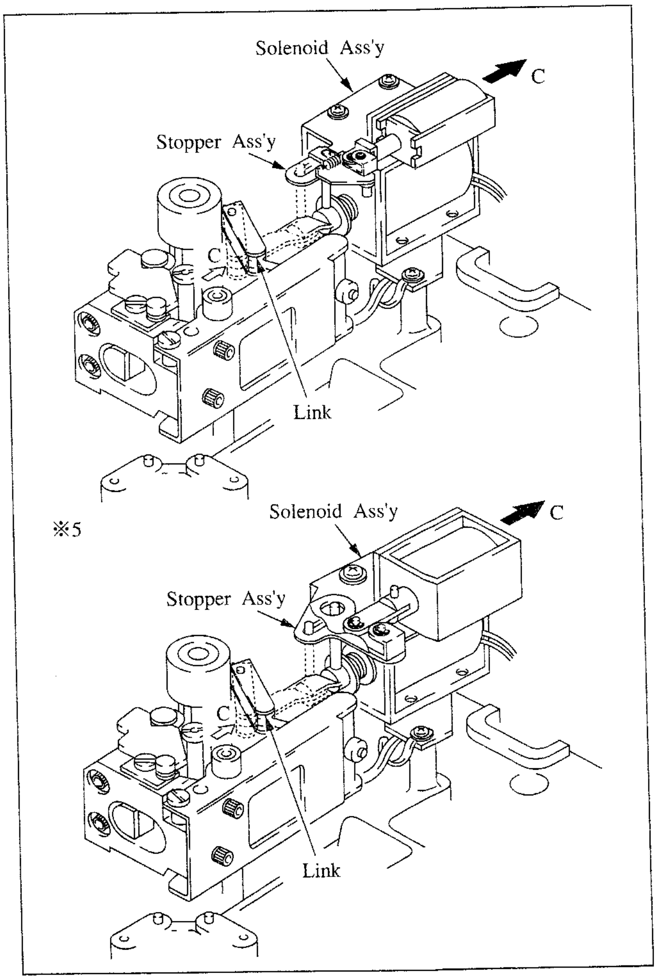

Solenoid Ass'y
C
Stopper Ass'y
C
Link
※5
Solenoid Ass'y
C
Stopper Ass'y
C
Link

Fig. 6-26-11 Press Position

(2) Make adjustments so that the backlash of the Pinch Block in the direction of arrow F is maximized when the Return Link Arm shown in Fig. 6-26-12 is drawn in the direction of arrow E.

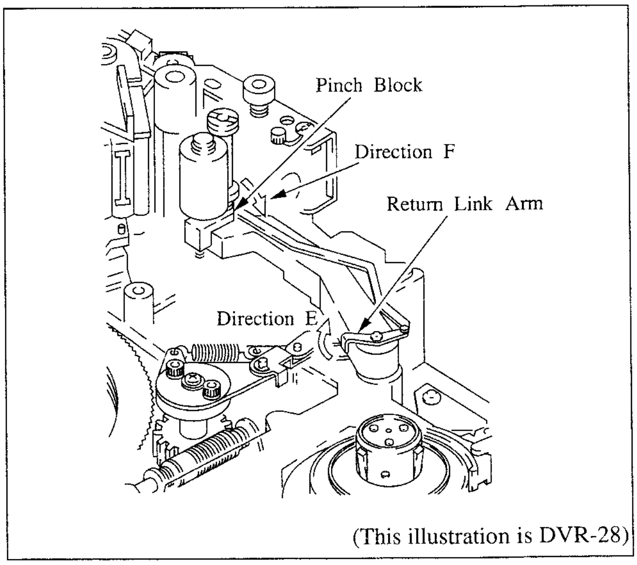

Pinch Block
Direction F
Return Link Arm
Direction E
(This illustration is DVR-28)

Fig. 6-26-12 Pinch Block Movement Confirmation

(3) Loosen the two screws shown in Fig. 6-26-13 by turning them by 90° to 180°.
Hexagonal wrench : 2.5 mm in width across flats
(4) Make adjustments by turning the adjusting screw so that the conditions set at step 2 are satisfied.
Hexagonal wrench : 2.5 mm in width across flats
(5) Maximize the backlash of the Pinch Block while repeating steps 3 and 4, then tighten the two screws.
(6) Make sure that the conditions set at step 2 have been satisfied. If they are not satisfied, retry from step 3.
(7) Unlock the Stopper Ass'y of the Pinch Roller Sub-solenoid Ass'y.
(8) Smear a little Molyton grease to the inside of the oblong hole in the Solenoid Ass'y.

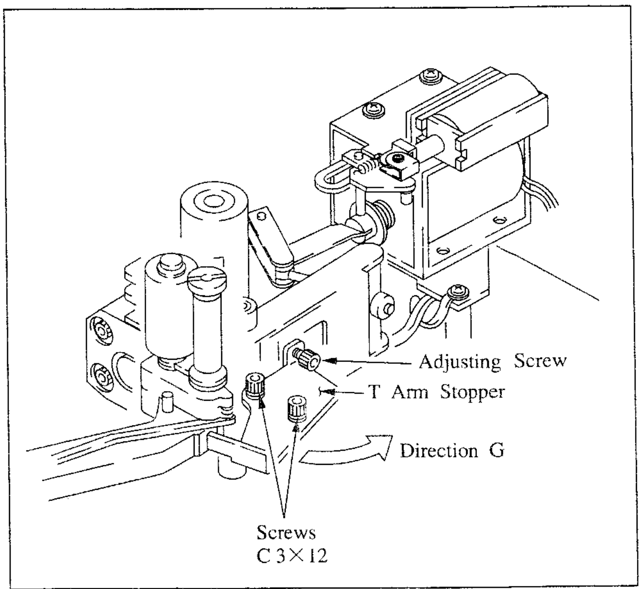

Adjusting Screw
T Arm Stopper
Direction G
Screws
C 3×12

Fig. 6-26-13 T Drawer Arm Position Adjustment

8. Press Plate stop position adjustment

Preparation

- In an unthreading-end state, turn the Worm Gear of the Loading Motor shown in Fig. 6-26-14 in the direction of arrow A.

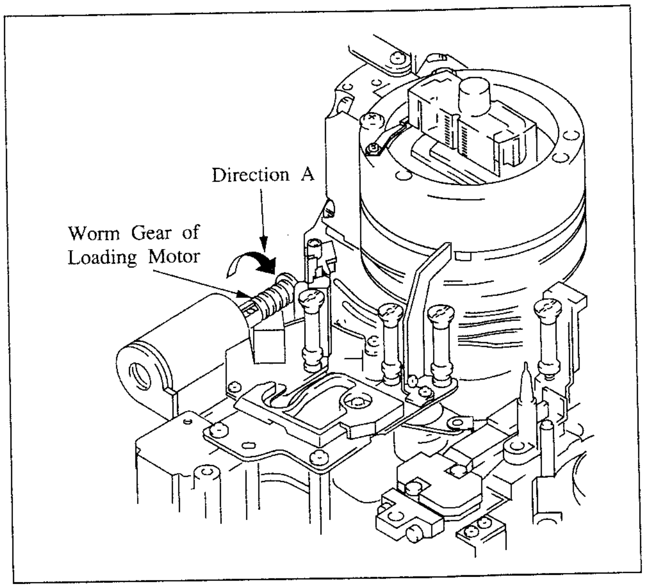

Direction A
Worm Gear of Loading Motor

Fig. 6-26-14 Worm Gear of the Loading Motor

(1) Insert a thickness gauge between the Capstan Shaft and the Pinch Roller shown in Fig. 6-26-15 and make sure that the following specification is met:

Note : Take care of the following when inserting the thickness gauge:

1. Wipe off the rust-preventive oil adhering to the thickness gauge with a cloth moistened with cleaning liquid. Do not allow oil to adhere to the Pinch Roller and Capstan Shaft.
2. Insert the thickness gauge as close as possible to the center of the Pinch Rollers.

Specification: Clearance K shall be such as to admit a 1.0-mm-thick thickness gauge but not a 1.5-mm-thick thickness gauge.

If the specification is met, proceed to step (9).
If the specification is not met, proceed to step (2).

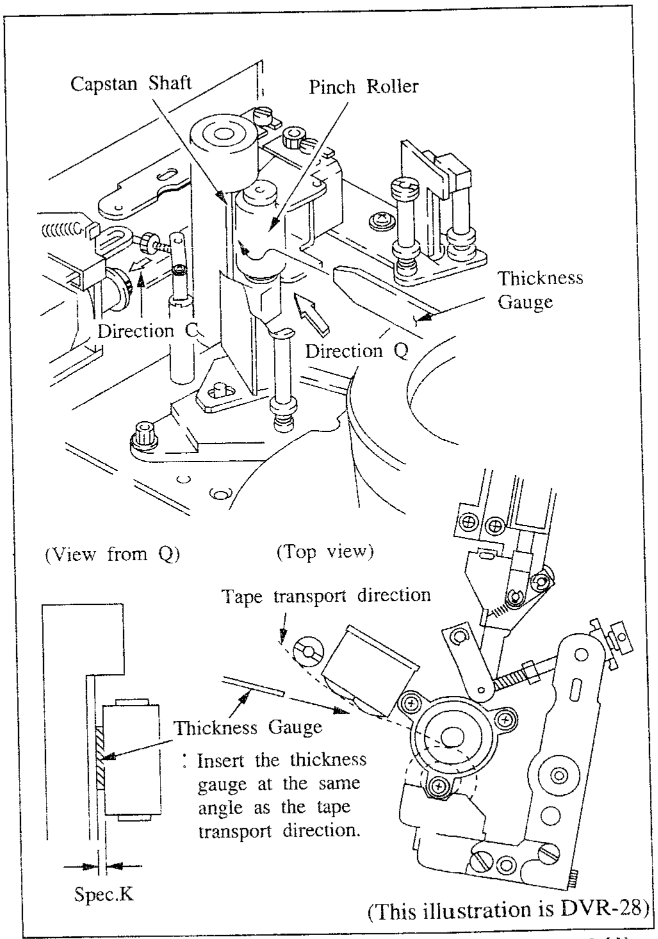

Capstan Shaft
Pinch Roller
Thickness Gauge
Direction C
Direction Q
(View from Q)
(Top view)
Tape transport direction
Thickness Gauge
: Insert the thickness gauge at the same angle as the tape transport direction.
Spec.K
(This illustration is DVR-28)

Fig. 6-26-15 Press Plate Stop Position Adjustment (1)

(2) Loosen the screw ⓓ shown in Fig. 6-26-16 by turning it by 90° to 180°.
Hexagonal wrench : 2.5 mm in width across flats

(3) Insert a 1.5-mm-thick thickness gauge between the Capstan Shaft and the Pinch Rollers.

Note : Take care of the following when inserting the thickness gauge:

1. Wipe off the rust-preventive oil adhering to the thickness gauge with a cloth moistened with cleaning liquid. Do not allow oil to adhere to the Pinch Rollers and Capstan Shaft.
2. Insert the thickness gauge as close as possible to the center of the Pinch Rollers.

(4) Strongly push the Link Unit in the direction of arrow C. Then insert a screwdriver into the adjustment hole of the Solenoid Stopper Plate and make an adjustment so that the top of the Solenoid Stopper Plate comes into contact with the T Arm.

(5) Remove the thickness gauge.

(6) Tighten the screw ⓓ.

(7) Locate the unthreading-end once, then locate the threading end.

(8) Retry step (1).
If the conditions set at step 1 are not satisfied, make a retry from step (2).

(9) After completion of adjustment, locate the unthreading-end.

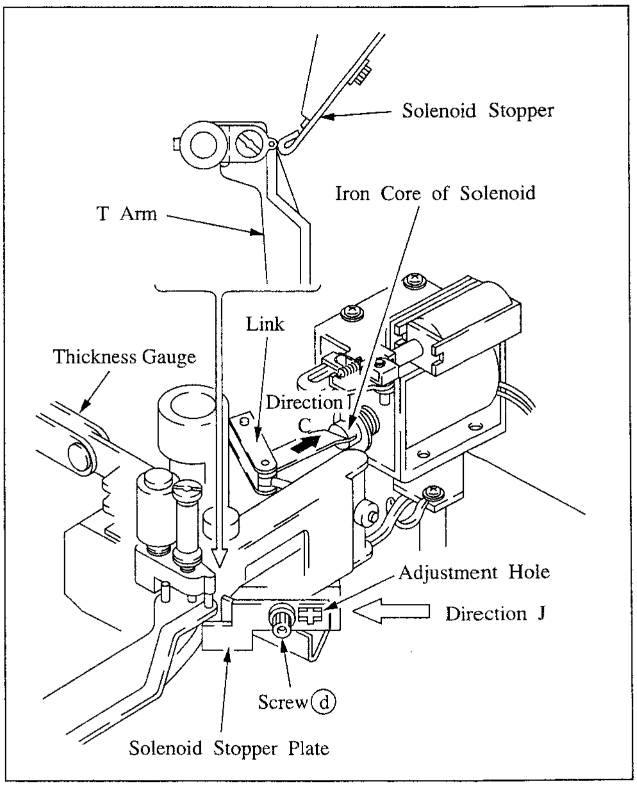

Solenoid Stopper
Iron Core of Solenoid
T Arm
Link
Thickness Gauge
Direction C
Adjustment Hole
Direction J
Screwⓓ
Solenoid Stopper Plate

Fig. 6-26-16 Press Plate Stop Position Adjustment (2)

9. Pinch Roller pressure adjustment
   (1) Turn on the power to the machine. When a cassette tape is set in the unit, press the eject button and remove the cassette tape.
   (2) Press the following control panel keys in sequence:

   [BKDV-101]
   TEST , F6 (CHECKER) , F1 (SP)
   F6 (F) , 2 , 5 , and SET

   [BKDV-200 series]
   1) SHIFT + SET UP
   2) ENTRY + center key + search dial (or V key) to enter the <TEST> menu. Turn the search dial clockwise or press V key to select 807. [CHECKER MODE].
   3) Press the > key to move the cursor to EXECUTE.
   4) Press the ^ key to enter CHECKER mode.
   5) Entry F25 by pressing the monitor select keys in the following sequence.
   INPUT CHECK + 5 (F), 2, 5, SET

   F can be input by selecting it the search dial and F1 (ALPH SET) key as well. (Refer to Section 6-(1)-4.)

   (3) Make the machine ready for threading without a cassette tape.
   (4) Set up the threading-end state by pressingthe < key on the control panel.
   Make sure that there is no gap left between theS/T Tape Drawer Arm and each stopper.
   (5) Press the following control panel keys to enter F26.

   [BKDV-101]
   F6 (F) , 2 , 6 , and SET

   [BKDV-200 series]
   INPUT CHECK + 5 (F), 2, 6, SET

   F can be input by selecting it the search dial and F1 (ALPH SET) key as well. (Refer to Section 6- (1) -4.)
   (6) Press the > key while pressing the cursor center key on the control panel. Fit the Pinch Rollers on the Capstan Shaft.

(7) Make sure that there is a gap left between the Press Limiter and the Press Arm Link shown in Fig. 6-26-17 If no gap is left, loosen the Press Limiter setscrew by turning it by 90° to 180°. Then, move the Press Limiter in the direction of the arrow shown in the figure to leave a gap, and tighten the setscrew.
Hexagonal wrench : across flats of 1.5 mm

Note : The Pinch Roller Sub-Solenoid Ass'y was changed to it with ※5 mark on the following sets. (Fig.6-26-17)

DVR-28 (UC) : S/N 12501 and higher
DVR-28P (UC) : S/N 11903 and higher
DVR-28P (EK) : S/N 12001 and higher
DVR-P28 (UC) : S/N 10401 and higher

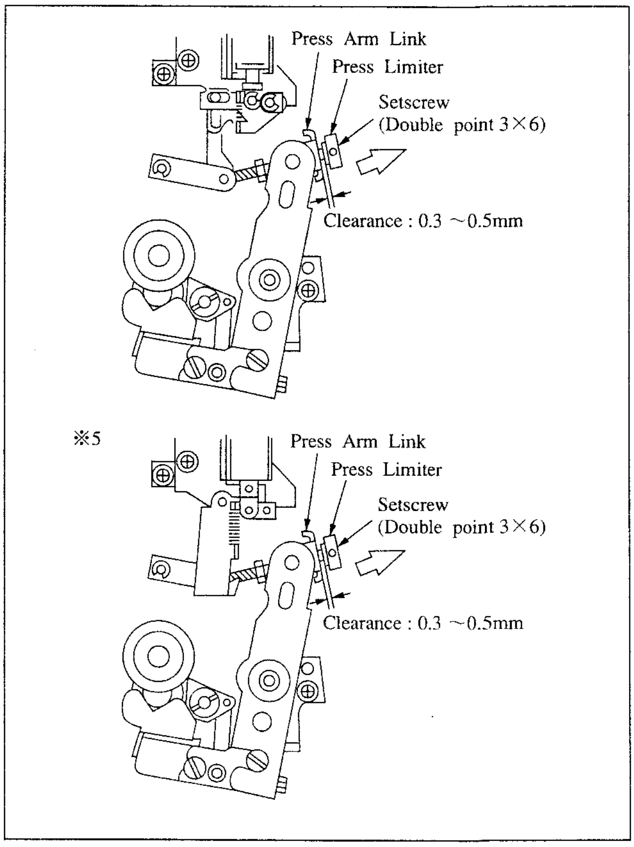

Press Arm Link
Press Limiter
Setscrew
(Double point 3×6)
Clearance : 0.3 ~0.5mm
※5
Press Arm Link
Press Limiter
Setscrew
(Double point 3×6)
Clearance : 0.3 ~0.5mm

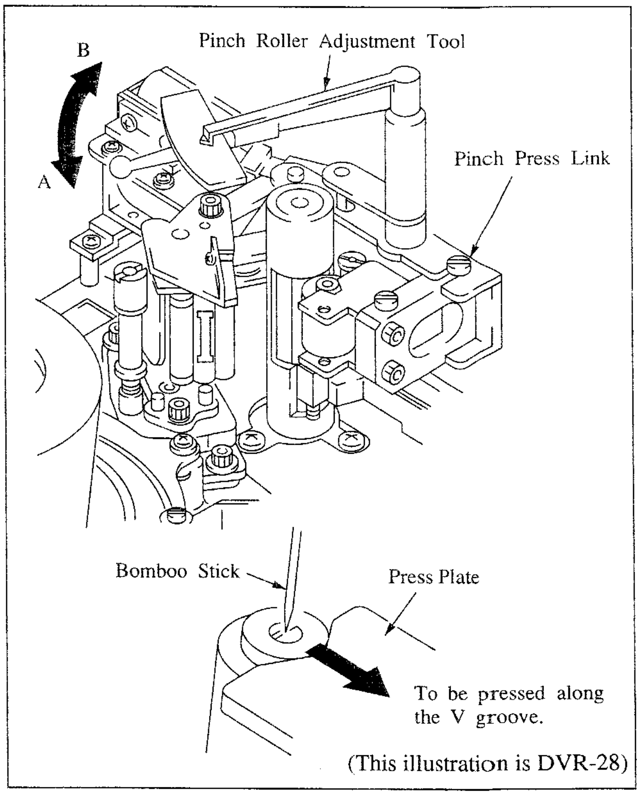
Fig. 6-26-17 Confirmation of Gap between Press Arm Link and Press Limiter

(8) Make sure that the Pinch Rollers are in contact with the Capstan Shaft.
Set the Pinch Roller Adjustment Tool shown in Fig. 6-26-18 on the Pinch Press Link.

(9) Separate the Pinch Roller about 1 mm from the Capstan Shaft by turning the Pinch Roller Adjustment Tool in the direction of arrow A. Then, gradually move the Pinch Roller toward the Capstan Shaft by turning the Pinch Roller Adjustment Tool shown in Fig. 6-26-15 in the direction of B.

Note : Hold lightly with a bamboo or wooden skewer or similar so that the Pinch Flange (Upper) does not separate from the V groove of the Press Plate.

(10)Read the torque value when the Pinch Roller starts rotating. Make sure that the torque value meets the following specification.
Specification: 58.8 x 10^{-2} N·m (6 kgf·cm) - 63.7 x 10^{-2} N·m (6.5 kgf·cm) If the specification is not met, perform step (11).


B
A
Pinch Roller Adjustment Tool
Pinch Press Link
Bomboo Stick
Press Plate
To be pressed along the V groove.

(This illustration is DVR-28)

Fig. 6-26-18 Pinch Roller Pressure Adjustment (1)

(11) Make adjustments by turning the locking nut shown in the drawing.
[Rotational direction of locking nut]
Direction A: Increasing torque value
Direction B: Decreasing torque value
Make sure that the torque value meets the specification.

Note : The Pinch Roller Sub-Solenoid Ass'y was changed to it with ※5 mark on the following sets. (Fig.6-26-19)

DVR-28 (UC) : S/N 12501 and higher
DVR-28P (UC) : S/N 11903 and higher
DVR-28P (EK) : S/N 12001 and higher
DVR-P28 (UC) : S/N 10401 and higher

(12) Detach the Pinch Roller Adjustment Tool from the Pinch Press Link.

(13) Break off the contact of the Pinch Rollers by pressing the < key on the control panel.

(14) Press the following control panel keys and enter F25.
[BKDV-101]
F6 (K), 2 , 5 , SET
[BKDV-200 series]
INPUT CHECK + 5 (F), 2, 5, SET

F can be input by selecting it the search dial and F1 (ALPH SET) key as well.
Then, return the tape driver to the unthreadingend by pressing the > key.

(15) Make sure that the S/T Drawer Arm and the Pinch Roller shown in Fig. 6-26-20 are in contact with the Stopper.

(16) Turn off the power to the machine.

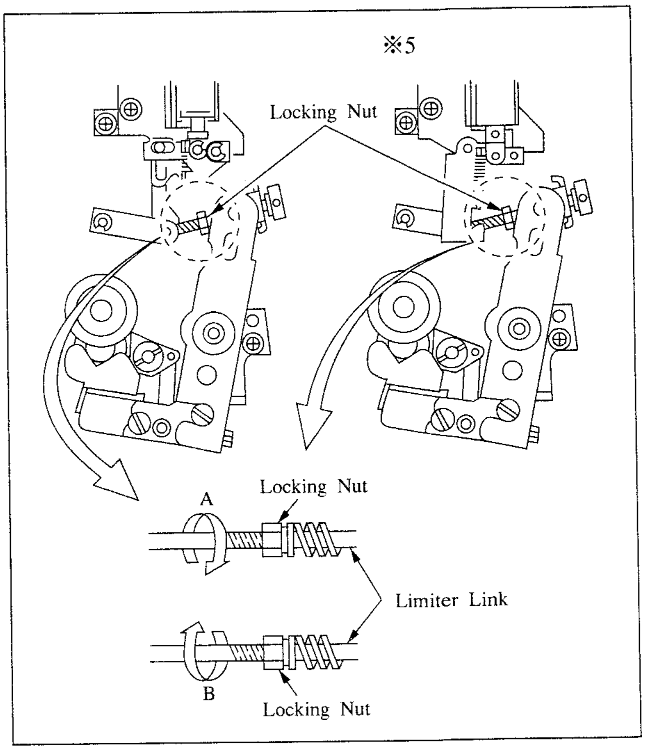


Fig. 6-26-19 Pinch Roller Pressure Adjustment (2)

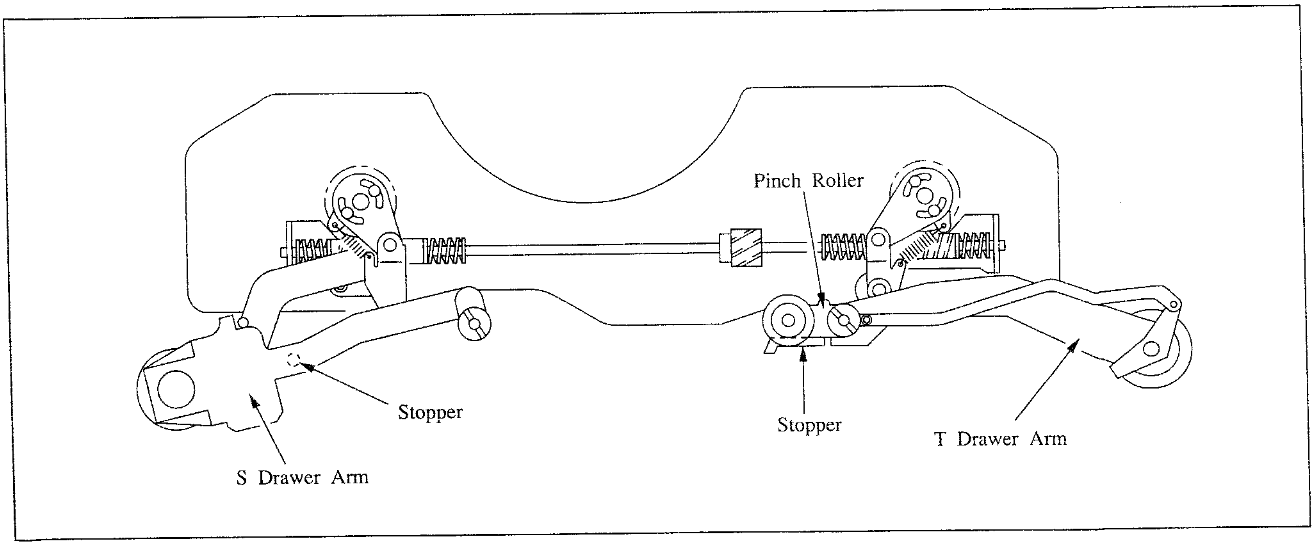


Fig. 6-26-20 Unthreading-end State Confirmation

Note : The Pinch Roller Sub-Solenoid Ass'y was changed to it with ※5 mark on the following sets. (Fig.6-26-21)

DVR-28 (UC) : S/N 12501 and higher
DVR-28P (UC) : S/N 11903 and higher
DVR-28P (EK) : S/N 12001 and higher
DVR-P28 (UC) : S/N 10401 and higher

10. Press Limiter position adjustment
   (1) Perform (1) and (2) in step 9 to set the device in the checker made of the drive system.
   (2) Perform (3) through (5) in step 9 to set the device in the check mode of the Pinch Roller.
   (3) Press the $\boxed{>}$ key while pressing the cursor center key on the control panel. Bring the Pinch Rollers into contact with the Capstan Shaft.
   (4) Make sure that the gap between the Press Limiter and the Press Arm Link shown in Fig. 6-26-21 meets the following specification:

   Specification: There must be a 0.3- to 0.5-mm gap left.

   If this specification is not met, make the following adjustments:
   A. Loosen the set screw of the Press Limiter by turning it by 90° to 180°.
   B. Insert a 0.4-mm thickness gauge between the Press Limiter and the Press Arm Link. Then, tighten the setscrew while pushing the limiter toward the link.
   Hexagonal wrench : 1.5 mm in width across flats
   Tightening torque : 78.4 × 10^{-2} N·m (8 kgf·cm)
   (5) Break off the contact of the Pinch Rollers by pressing the $\boxed{<}$ key on the control panel. Perform steps (3) and (4) again and make sure that the gap meets the specification.
   (6) Break off the contact of the Pinch Rollers by pressing the $\boxed{<}$ key on the control panel.
   (7) Press the following control panel keys and enter F25.
   [BKDV-101]
   $\boxed{F6}$ (K), $\boxed{2}$, $\boxed{5}$, and $\boxed{SET}$
   [BKDV-200 series]
   $\boxed{INPUT\ CHECK}$ + $\boxed{5}$ (F), $\boxed{2}$, $\boxed{5}$, $\boxed{SET}$

   F can be input by selecting it the search dial and $\boxed{F1}$ (ALPH SET) key as well. (Refer to Section 6- (1) -4.)
   Then, return the tape driver to the unthreadingend by pressing the $\boxed{>}$ key.
   (8) Turn off the power to the machine.

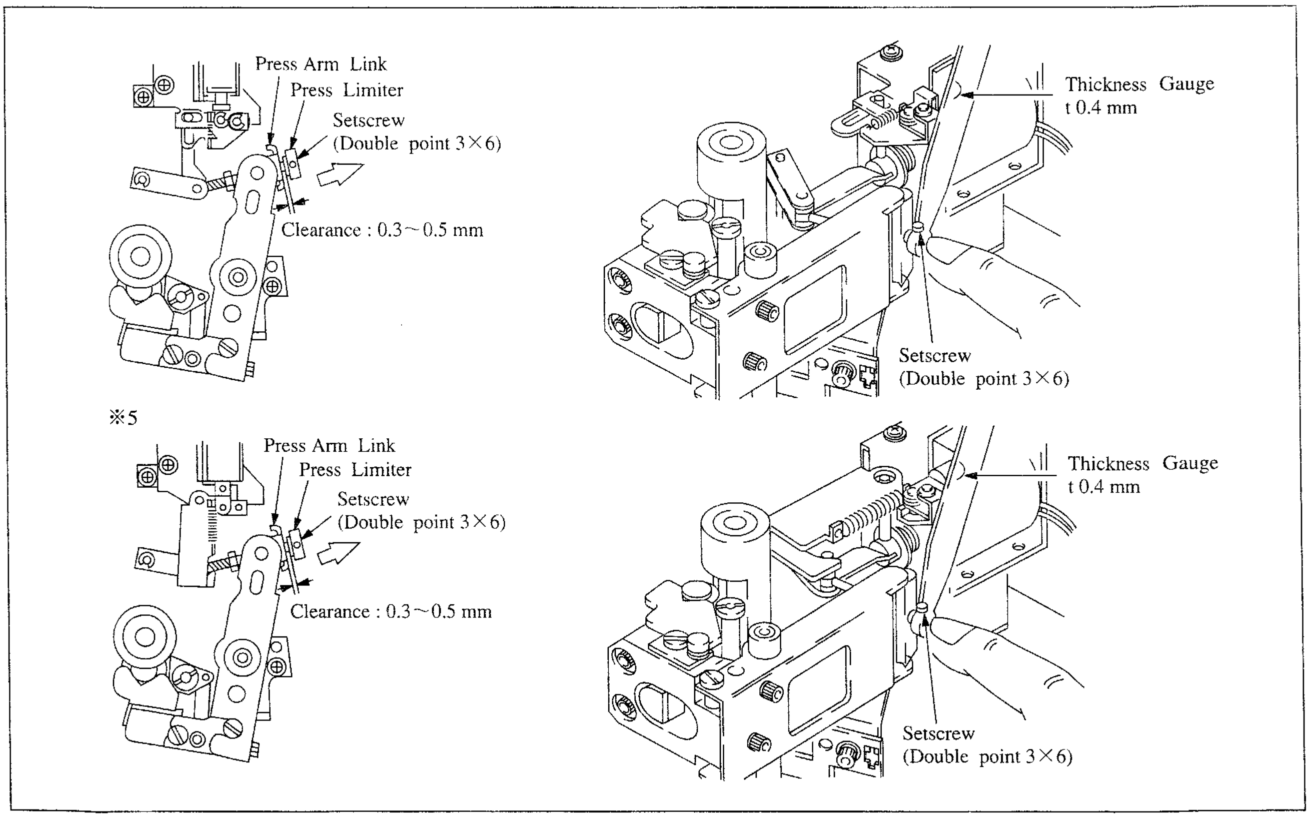

Press Arm Link
Press Limiter
Setscrew
(Double point 3×6)
Clearance : 0.3~0.5 mm
Thickness Gauge
t 0.4 mm
Setscrew
(Double point 3×6)
※5
Press Arm Link
Press Limiter
Setscrew
(Double point 3×6)
Clearance : 0.3~0.5 mm
Thickness Gauge
t 0.4 mm
Setscrew
(Double point 3×6)

Fig. 6-26-21 Press Limiter Position Adjustment

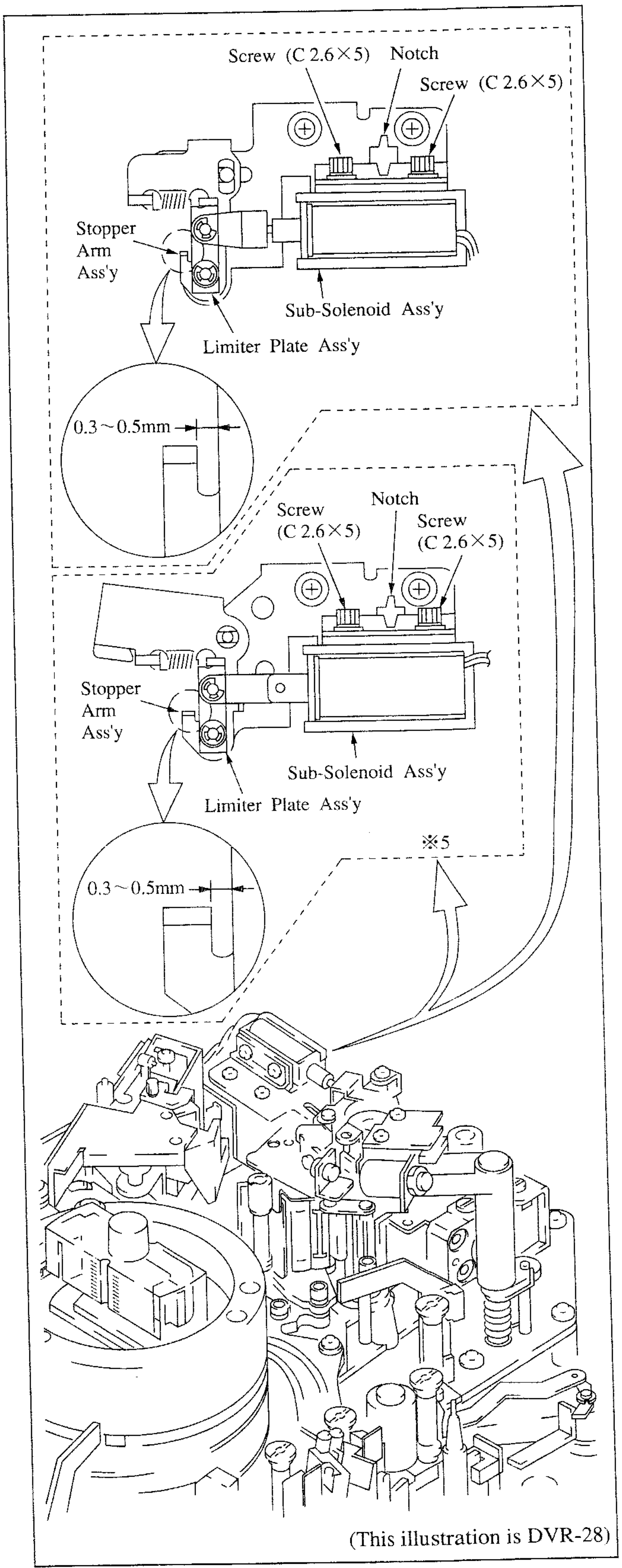
11. Stopper Arm Ass'y position adjustment
    (1) Loosen the two screws shown in Fig. 6-26-22 by turning them by 90° to 180°.
    (2) Insert a (–3mm) screwdriver in the notch and insert a 0.4-mm thickness gauge in the gap between the Limiter Plate Ass'y and the Stopper Arm Ass'y. Then, make an adjustment by turning the screwdriver clockwise so that the gap meets the specification.

        Specification: There must be a 0.3- to 0.5-mm gap left.

    (3) Apply a very small amount of Locking Compound "Screw Lock" to the heads of two screws.

Note : The Pinch Roller Sub-Solenoid Ass'y was changed to it with ※5 mark on the following sets. (Fig.6-26-22)

DVR-28 (UC) : S/N 12501 and higher
DVR-28P (UC) : S/N 11903 and higher
DVR-28P (EK) : S/N 12001 and higher
DVR-P28 (UC) : S/N 10401 and higher


Screw (C 2.6×5)
Notch
Screw (C 2.6×5)
Stopper Arm Ass'y
Sub-Solenoid Ass'y
Limiter Plate Ass'y
0.3～0.5mm
Screw (C 2.6×5)
Notch
Screw (C 2.6×5)
Stopper Arm Ass'y
Sub-Solenoid Ass'y
Limiter Plate Ass'y
※5
0.3～0.5mm

(This illustration is DVR-28)

Fig. 6-26-22 Stopper Arm Ass'y Position Adjustment

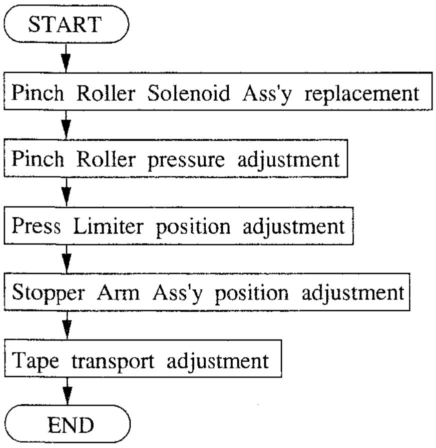
12. T Guide Base Ass'y Installation
    Reverse the procedure in step 1.

13. Tape transport adjustment
    Refer to Section 9.

6-26-2. Pinch Roller Solenoid Ass'y Replacement

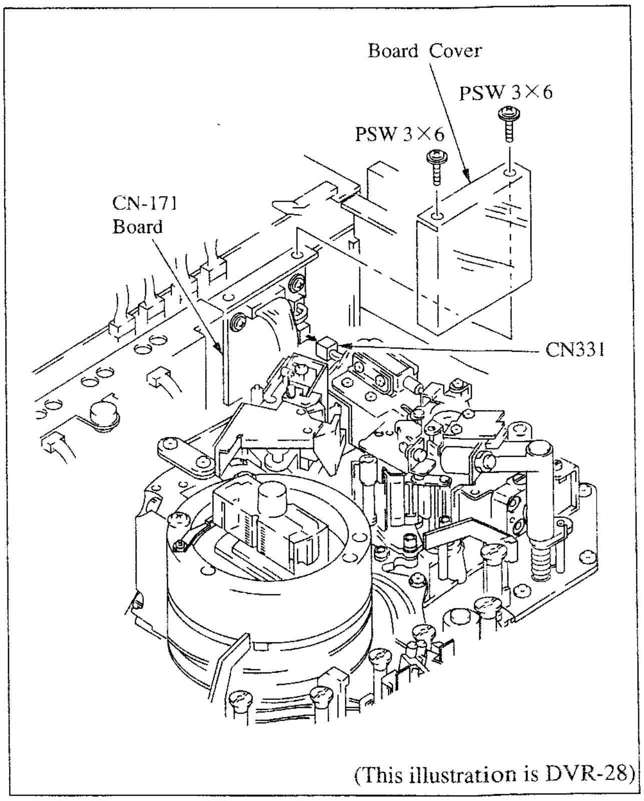
Basic Knowledge

- Replacement flowchart


START
Pinch Roller Solenoid Ass'y replacement
Pinch Roller pressure adjustment
Press Limiter position adjustment
Stopper Arm Ass'y position adjustment
Tape transport adjustment
END

Replacement

1. Pinch Roller Solenoid Ass'y Replacement (Fig. 6-26-23)
    (1) Remove the two screws that hold the Board Cover and remove the Board Cover.
    (2) Disconnect connector CN331 from board CN-171.


Board Cover
PSW 3×6
PSW 3×6
CN-171 Board
CN331

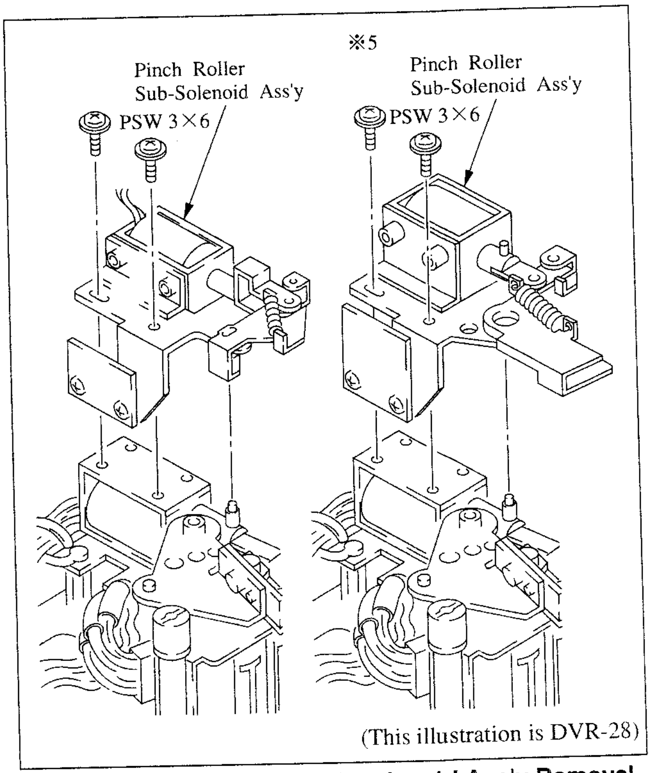
(This illustration is DVR-28)

Fig. 6-26-23 Connector Removal

(3) Remove the two screws shown in Fig. 6-26-24 and remove the Sub-Solenoid Ass'y.

Note : The Pinch Roller Sub-Solenoid Ass'y was changed to it with ※5 mark on the following sets. (Fig.6-26-24)

DVR-28 (UC) : S/N 12501 and higher
DVR-28P (UC) : S/N 11903 and higher
DVR-28P (EK) : S/N 12001 and higher
DVR-P28 (UC) : S/N 10401 and higher


※5
Pinch Roller Sub-Solenoid Ass'y
PSW 3×6
Pinch Roller Sub-Solenoid Ass'y
PSW 3×6

(This illustration is DVR-28)

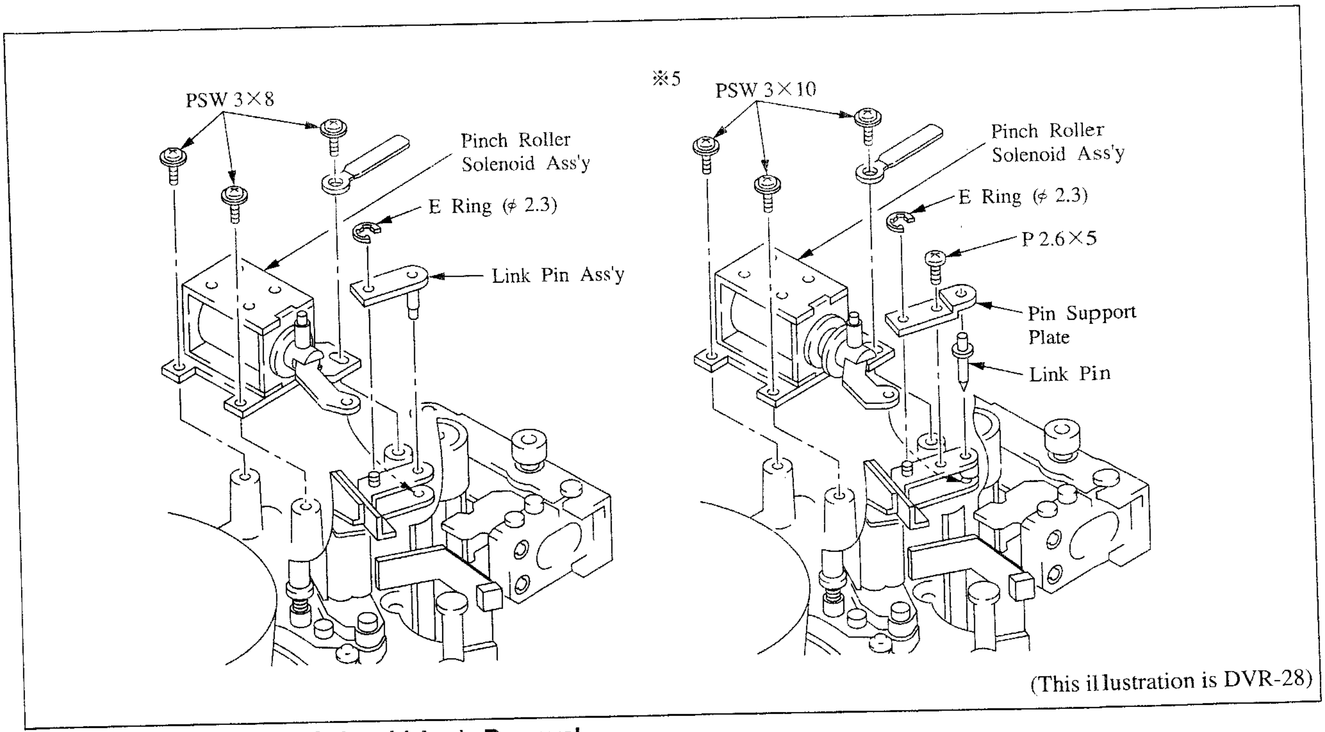
Fig. 6-26-24 Pinch Roller Sub-solenoid Ass'y Removal

(4) Detach the E-ring fixing the Link Pin Ass'y shown in Fig. 6-26-25.
(Remove the scrw with ※5 mark, and remove the Pin Support Plate and Link Pin.)

Note : The Pinch Roller Solenoid Ass'y was changed to it with ※5 mark on the following sets. (Fig.6-26-25)

DVR-28 (UC) : S/N 12501 and higher
DVR-28P (UC) : S/N 11903 and higher
DVR-28P (EK) : S/N 12001 and higher
DVR-P28 (UC) : S/N 10401 and higher

(5) Remove the three screws that hold the Pinch Roller Solenoid Ass'y and detach the Pinch Roller Solenoid Ass'y.


PSW 3×8
Pinch Roller Solenoid Ass'y
E Ring (φ 2.3)
Link Pin Ass'y
※5
PSW 3×10
Pinch Roller Solenoid Ass'y
E Ring (φ 2.3)
P 2.6×5
Pin Support Plate
Link Pin

(This illustration is DVR-28)

Fig. 6-26-25 Pinch Roller Solenoid Ass'y Removal

(6) Replace the required components of the Pinch Roller Solenoid Ass'y shown in Fig. 6-26-26.

Note1: Before replacement, clean the mounting surface of each component. Smear a little Molyton grease to the parts indicated.

Note2: The parts with ※5 mark were changed on the following sets as shown in Fig.6-26-26.

DVR-28 (UC) : S/N 12501 and higher
DVR-28P (UC) : S/N 11903 and higher
DVR-28P (EK) : S/N 12001 and higher
DVR-P28 (UC) : S/N 10401 and higher

(7) Reassemble the Ass'y by reversing the procedure in steps 1 to 5.

Adjustment

2. Pinch Roller pressure adjustment
   Perform step 9 in Section 6-26-1.
3. Press Limiter position adjustment
   Perform step 10 in Section 6-26-1.
4. Stopper Arm Ass'y position adjustment
   Perform step 11 in Section 6-26-1.
5. Tape transport adjustment
   Refer to Section 9.

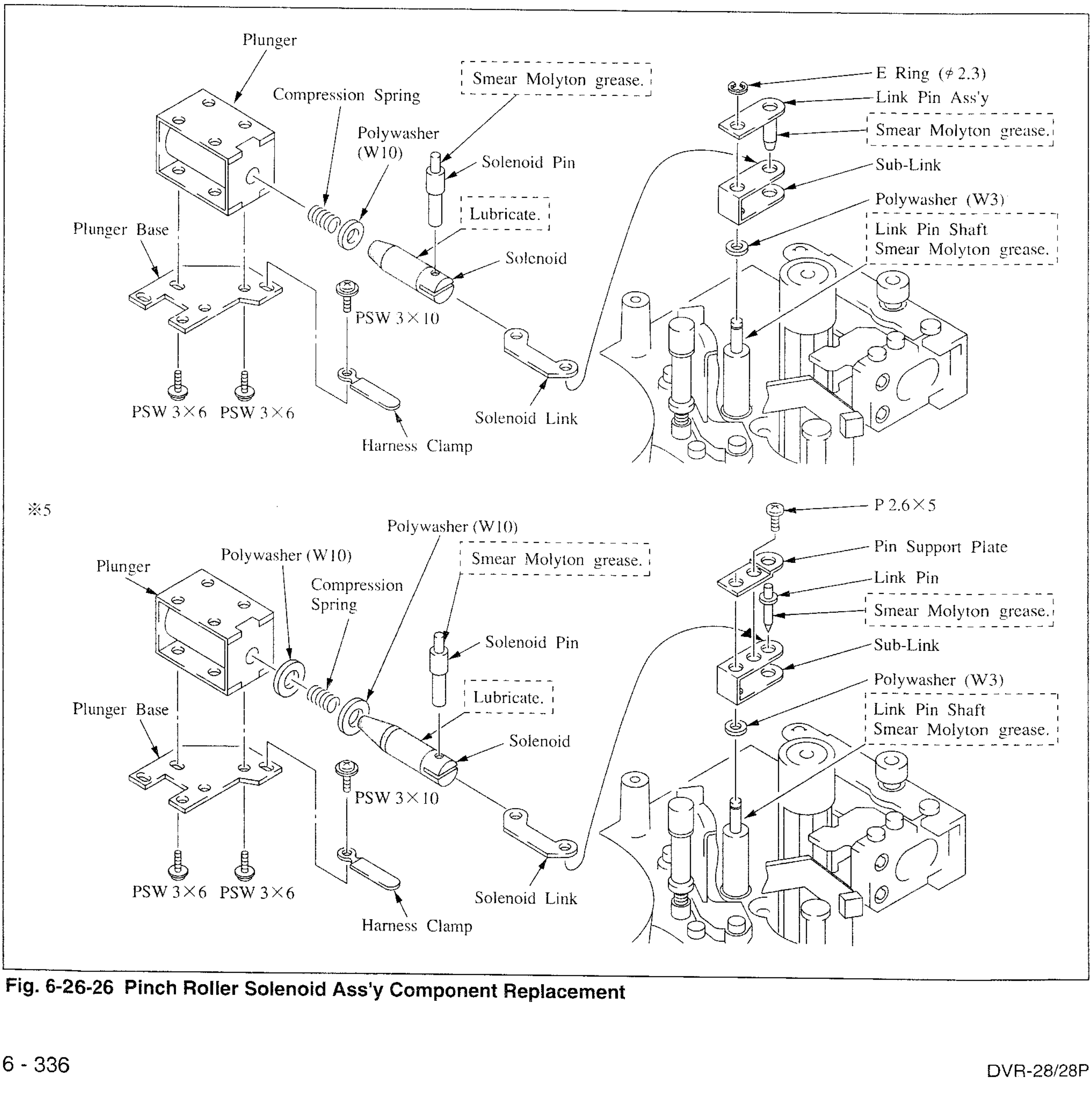
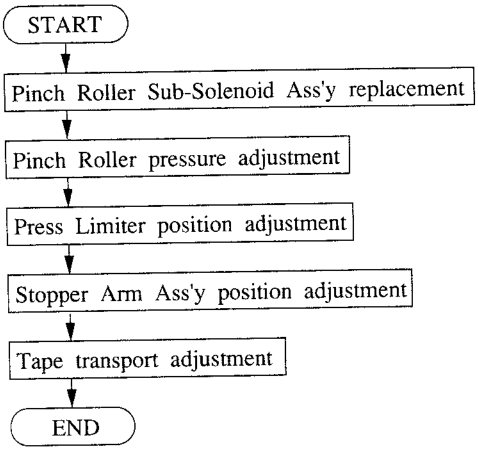

Plunger
Compression Spring
Smear Molyton grease.
Polywasher (W10)
Solenoid Pin
Lubricate.
Plunger Base
Solenoid
PSW 3×10
PSW 3×6
PSW 3×6
Solenoid Link
Harness Clamp
E Ring (ϕ2.3)
Link Pin Ass'y
Smear Molyton grease.
Sub-Link
Polywasher (W3)
Link Pin Shaft
Smear Molyton grease.
※5
Polywasher (W10)
Plunger
Polywasher (W10)
Smear Molyton grease.
Compression Spring
Solenoid Pin
Lubricate.
Plunger Base
Solenoid
PSW 3×10
PSW 3×6
PSW 3×6
Solenoid Link
Harness Clamp
P 2.6×5
Pin Support Plate
Link Pin
Smear Molyton grease.
Sub-Link
Polywasher (W3)
Link Pin Shaft
Smear Molyton grease.

Fig. 6-26-26 Pinch Roller Solenoid Ass'y Component Replacement

6-26-3. Pinch Roller Sub-Solenoid Ass'y Replacement

Basic Knowledge

- Replacement flowchart

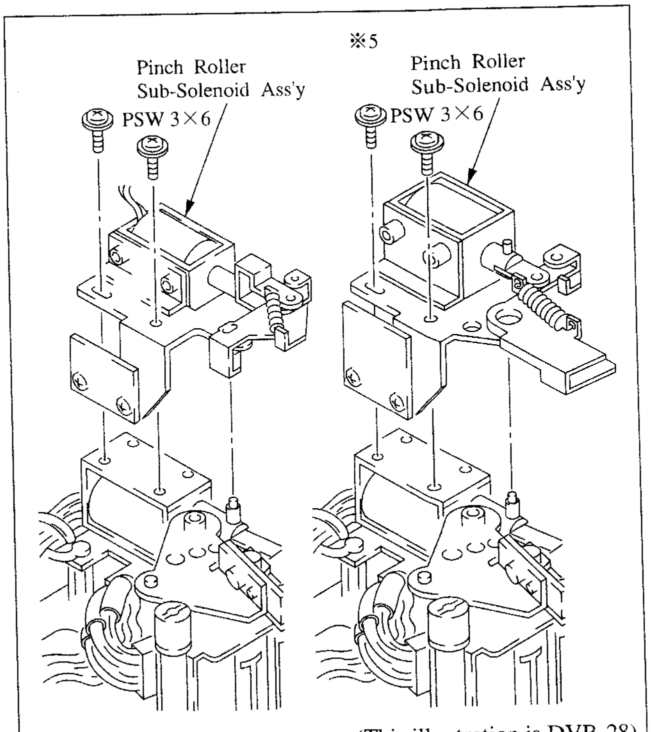

START
Pinch Roller Sub-Solenoid Ass'y replacement
Pinch Roller pressure adjustment
Press Limiter position adjustment
Stopper Arm Ass'y position adjustment
Tape transport adjustment
END

Replacement

1. Pinch Roller Sub-solenoid Ass'y replacement (Fig. 6-26-27)
   (1) Remove the two screws that hold the Pinch Roller Sub-Solenoid Ass'y and detach the Pinch Roller Sub-Solenoid Ass'y.

Note : The Pinch Roller Sub-Solenoid Ass'y was changed to it with ※5 mark on the following sets. (Fig.6-26-27)

DVR-28 (UC) : S/N 12501 and higher
DVR-28P (UC) : S/N 11903 and higher
DVR-28P (EK) : S/N 12001 and higher
DVR-P28 (UC) : S/N 10401 and higher


※5
Pinch Roller Sub-Solenoid Ass'y
PSW 3×6
Pinch Roller Sub-Solenoid Ass'y
PSW 3×6

(This illustration is DVR-28)

Fig. 6-26-27 Pinch Roller Sub-Solenoid Ass'y Removal

(2) Replace the required components of the Pinch Roller Sub-Solenoid Ass'y shown in the figure.

Note1: Before replacement, clean the mounting surface of each component.

Note2: The parts with ※5 mark were changed on the following sets as shown in Fig.6-26-28.

DVR-28 (UC) : S/N 12501 and higher
DVR-28P (UC) : S/N 11903 and higher
DVR-28P (EK) : S/N 12001 and higher
DVR-P28 (UC) : S/N 10401 and higher

(3) Smear a little the Molyton Grease onto the 5 portions in Fig. 6-26-28.

(4) Install the Pinch Roller Sub-Solenoid Ass'y in the reverse procedure (1).

Adjustment

2. Pinch Roller pressure adjustment
   Perform step 9 in Section 6-26-1.
3. Press Limiter position adjustment
   Perform step 10 in Section 6-26-1.
4. Stopper Arm Ass'y position adjustment
   Perform step 11 in Section 6-26-1.
5. Tape transport adjustment
   Refer to Section 9.

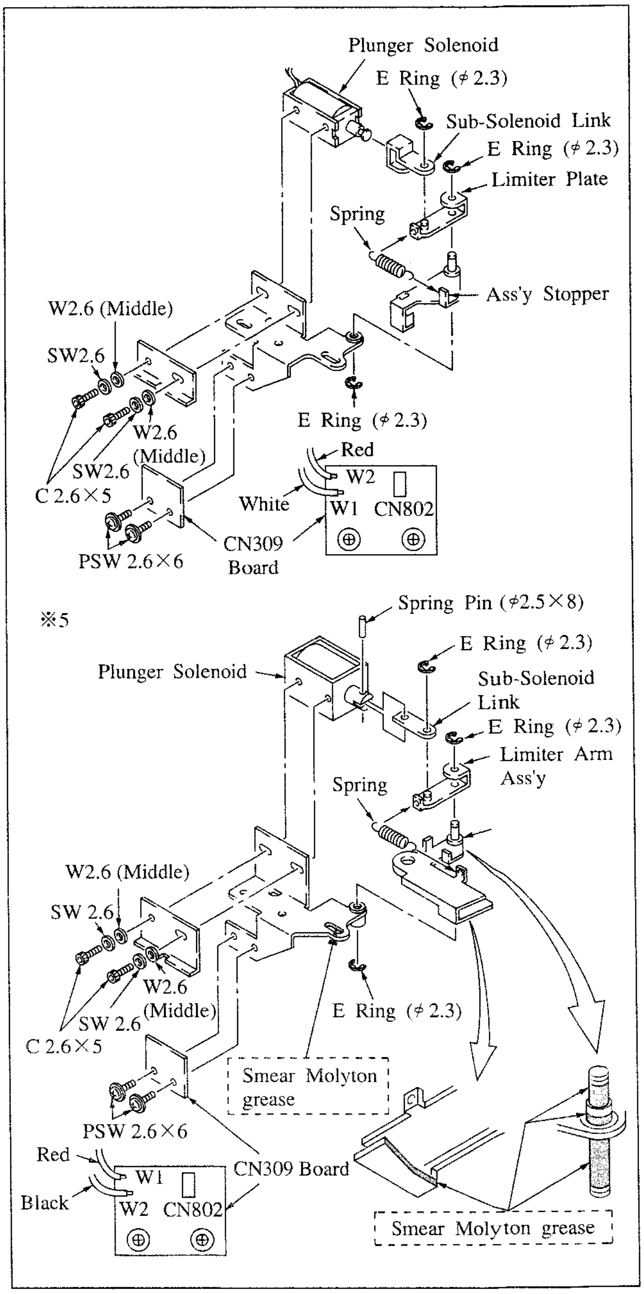

Plunger Solenoid
E Ring (φ2.3)
Sub-Solenoid Link
E Ring (φ2.3)
Limiter Plate
Spring
Ass'y Stopper
W2.6 (Middle)
SW2.6
E Ring (φ2.3)
W2.6 (Middle)
SW2.6
C 2.6×5
Red
W2
White
W1 CN802
CN309 Board
PSW 2.6×6
※5
Spring Pin (φ2.5×8)
E Ring (φ2.3)
Plunger Solenoid
Sub-Solenoid Link
E Ring (φ2.3)
Limiter Arm Ass'y
Spring
W2.6 (Middle)
SW 2.6
W2.6 (Middle)
SW 2.6
E Ring (φ2.3)
C 2.6×5
Smear Molyton grease
PSW 2.6×6
Red
Black
W1
W2 CN802
CN309 Board
Smear Molyton grease

Fig. 6-26-28 Pinch Roller Sub-Solenoid Ass'y Conponent Replacement

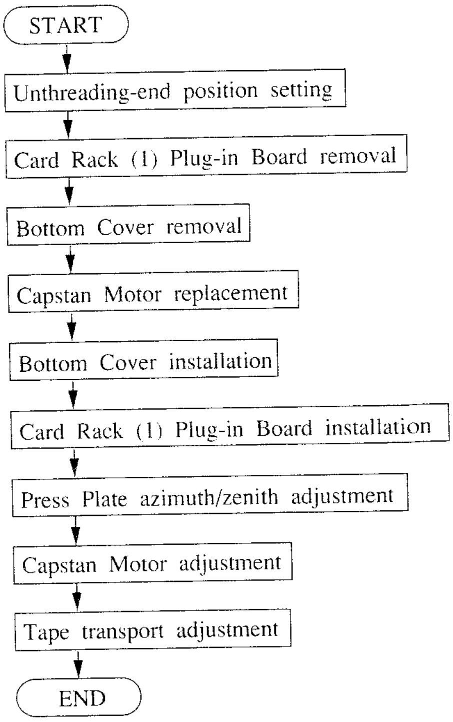
6-27. CAPSTAN MOTOR REPLACEMENT

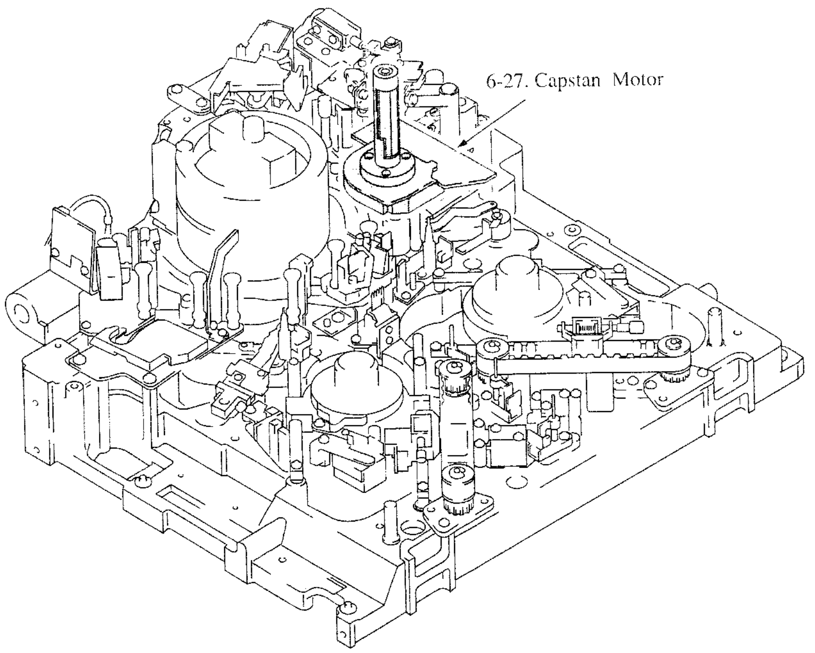
Basic Knowledge

A. The Capstan Motor is shown in Figure 6-27-1. The following parts need to be removed before replacement.
- Card Rack (1) Plug-in Board
- Bottom Cover

B. Prepare the following material for replacement and adjustment.
- Pinch Roller Adjuatment Tool
  Sony Parts No. : J-6251-210-A
- Pinch Roller Check Tool
  Sony Parts No. : J-6253-750-A
- Cleaning Liguid (or equivalent)
  Sony Parts No. : 9-919-573-00

C. Replacement flowchart


START
Unthreading-end position setting
Card Rack (1) Plug-in Board removal
Bottom Cover removal
Capstan Motor replacement
Bottom Cover installation
Card Rack (1) Plug-in Board installation
Press Plate azimuth/zenith adjustment
Capstan Motor adjustment
Tape transport adjustment
END


6-27. Capstan Motor

(This illustration is DVR-28)

Fig. 6-27-1 Capstan Motor

Replacement

1. Unthreading-end position setting (Fig. 6-27-2)
   - Set the machine to the unthreading-end state by turning the Worm Gear of the Loading Motor in the direction of arrow B.

2. Card Rack (1) Plug-in Board removal
   Refer to Section 6-2.

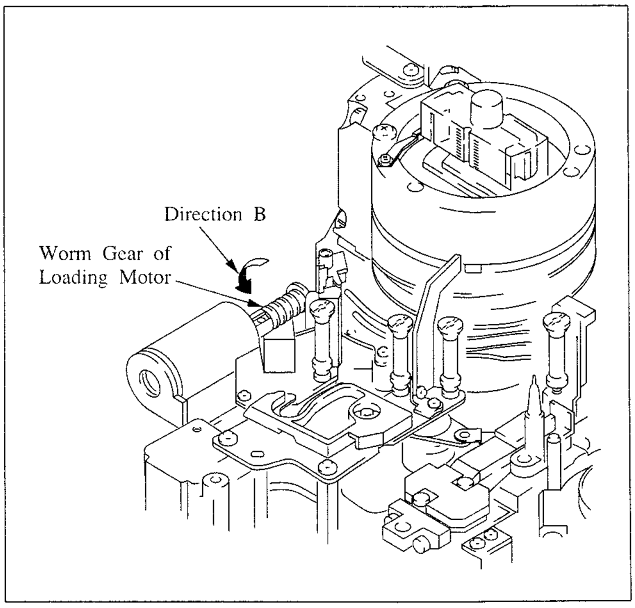

Direction B
Worm Gear of Loading Motor

Fig. 6-27-2 Unthreading-End Position Setting

3. Bottom Cover removal (Fig. 6-27-3)
   (1) Lay the machine with the Power Block down.

   Note : Take care to avoid giving a shock to the machine.

   (2) Remove the four screws fixing the Bottom Cover and remove the Bottom Cover.

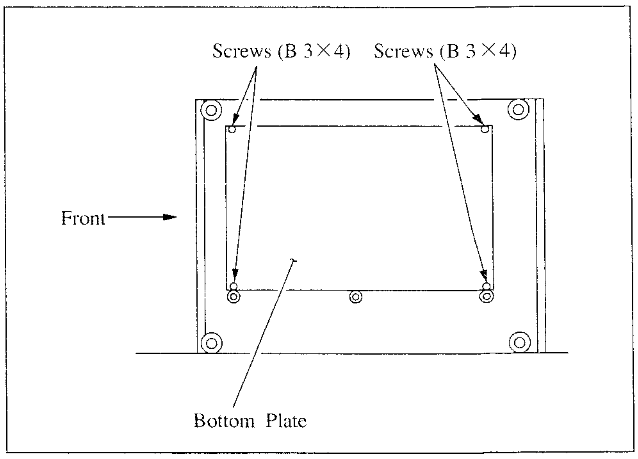

Screws (B 3×4)
Screws (B 3×4)
Front
Bottom Plate

Fig. 6-27-3 Bottom Cover Removal

4. Capstan Motor replacement
   (1) Disconnect the connector shown in Fig. 6-27-4 from the Capstan Motor.
   (2) While holding the Capstan Motor by hand, remove the three screws fixing the Capstan Motor (Fig. 6-27-5).
   (3) Tilt the Capstan Motor, as paying attention so that it does not hit the Confidence Head Bracket, then remove it by pulling it in the direction shown in the figure.
   (4) Clean the mounting surfaces of a new Capstan Motor, its Capstan Shaft, and the Base Plate with a cloth moistened with cleaning liquid.
   (5) Install the new Capstan Motor in the machine with rotating counterclockwise by reversing the procedure in steps 1 and 2.

   Note : When installing the Capstan Motor, pay extra attention so that the shaft of the motor is not scratched.

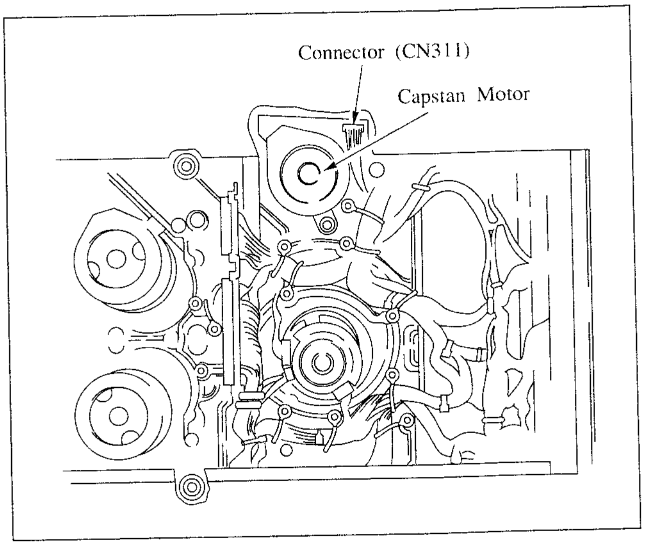

Connector (CN311)
Capstan Motor

Fig. 6-27-4 Connector Removal

5. Bottom Cover installation
   - Install the Cover by reversing the procedure in step 3.

6. Card Rack (1) Plug-in Board installation
   Refer to Section 6-2.

Adjustment

7. Press Plate azimuth/zenith adjustment
   Refer to Section 6-26-1.

8. Capstan Motor adjustment
   Refer to Section 10.

9. Tape transport adjustment
   Refer to Section 9.

(This illustration is DVR-28)

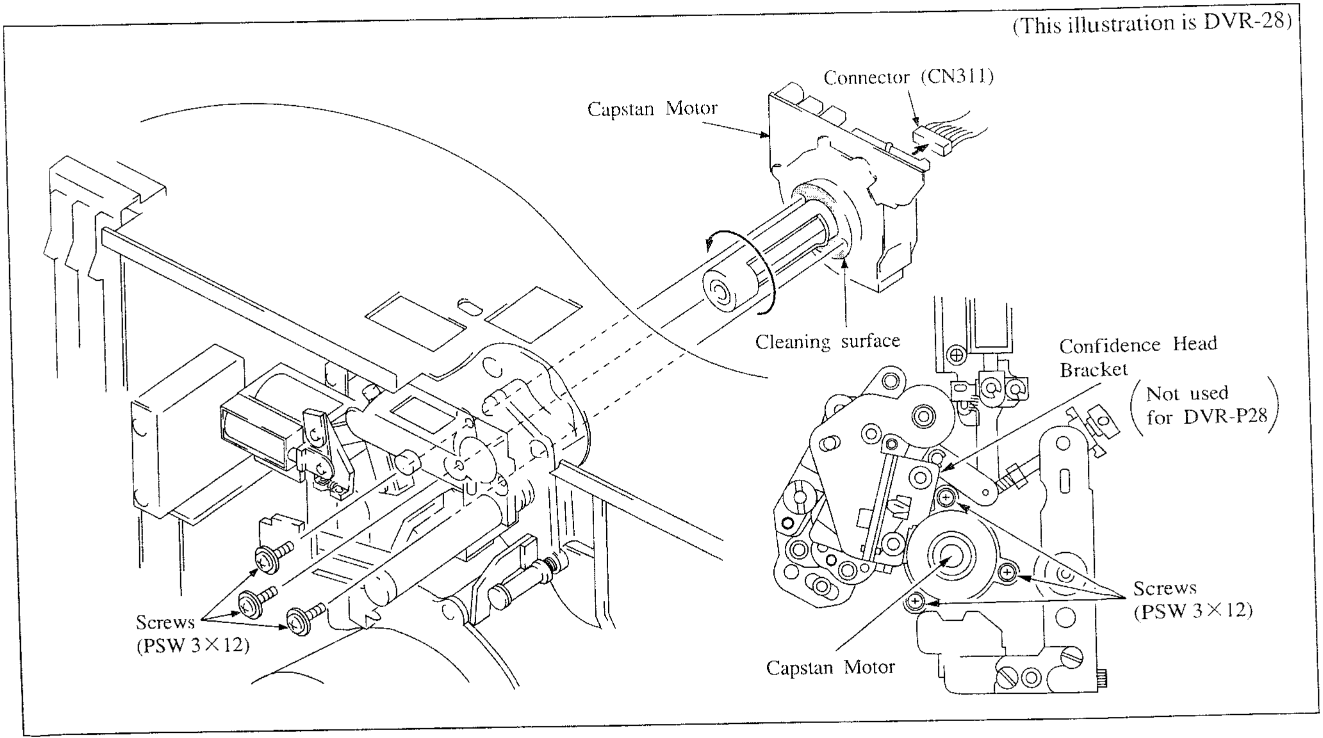

Capstan Motor
Connector (CN311)
Cleaning surface
Confidence Head Bracket
(Not used for DVR-P28)
Screws (PSW 3×12)
Screws (PSW 3×12)
Capstan Motor

Fig. 6-27-5 Capstan Motor Replacement

SECTION 7
GENERAL INFORMATION FOR ALIGNMENT

7-1. INDEX OF ALIGNMENT

The list below shows all the adjustments on each printed board together with the corresponding pages.

AD-73 board
RV1 14-15
RV3 14-14
RV4 14-15
RV5 14-16
RV6 14-15
RV7 14-20
(S/N 10001 thru 10599)
RV8 14-19
(S/N 10001 thru 10599)
RV9 14-16
RV10 14-17
RV11 ....14-17, 19
RV12 14-17
RV13 14-17
RV14 14-18
RV16 14-20
RV17 14-20
RV201 15-7
RV202 15-5
RV203 15-7
RV204 15-7
RV205 15-6
RV206 15-6
(S/N 10901 and higher)
RV207 15-5
RV301 15-7
RV302 15-5
RV303 15-7
RV304 15-7
RV305 15-6
RV306 15-6
(S/N 10901 and higher)
RV307 15-5
RV401 15-7
RV402 15-5
RV403 15-7
RV404 15-7
RV405 15-6
RV406 15-6
(S/N 10901 and higher)
RV407 15-5
RV501 15-7
RV502 15-5
RV503 15-7
RV504 15-7
RV505 15-6
RV506 15-6
(S/N 10901 and higher)
RV507 15-5

LV2 14-14

AE-15 board
RV1 11-3
RV2 11-3
RV3 11-7
RV4 11-8
RV5 11-8
RV6 11-4
RV7 11-4
RV8 11-3
RV9 11-9
RV10 11-9
RV11 11-10
RV12 11-10
RV13 11-3
RV14 11-6
RV15 11-6
RV16 11-6
RV17 11-3
RV18 11-9
RV19 11-10
RV100 11-7
RV101 11-7
RV102 11-10
RV103 11-10
RV104 11-3
RV105 11-3

LV1 11-7
LV2 11-7
LV3 11-7
LV4 11-5
LV5 11-5
LV6 11-5
LV7 11-7
LV8 11-7

CT-133 board
RV1 8-6
RV2 8-5

DD-11 board
RV601 12-3

DT-16 board
RV101 12-3
RV102 12-6
RV103 12-4
RV105 12-5
RV106 12-7

ED-24 board
RV1 11-11
RV2 11-11

EQ-29 board
RV102 13-16
RV103 13-16
RV202 13-16
RV203 13-16
RV301 13-10
RV302 13-10
RV303 13-10
RV304 13-10
RV305 13-10
RV306 13-10
RV307 13-10
RV308 13-10
RV401 ......13-9, 17
RV402 ......13-9, 17
RV501 ......13-9, 17
RV502 ......13-9, 17

LV401 ......13-9, 17
LV501 ......13-9, 17

LO-14 board
RV101 15-5
RV201 15-5
RV301 15-5
RV401 15-5
RV501 15-5
RV601 15-5

PR-163 board
RV1 14-9
RV2 14-10
RV3 ....14-9, 12
RV4 ....14-11, 13
RV6 14-11
RV7 14-8

LV1 14-7

RE-52 board
RV1 8-4
RV2 8-5
RV3 8-4
RV4 8-5
RV5 8-4
RV6 8-5
RV7 8-3
RV8 8-3
RV9 8-3
RV10 8-6

REC-11P board
RV101 ......13-7, 8, 15
RV102 13-6
RV150 13-19
RV201 ......13-8, 15
RV202 13-6
RV250 ......13, 19
RV301 ......13-8, 15
RV302 13-6
RV350 13-19
RV401 ......13-8, 15
RV402 13-6
RV450 13-19

VM-05 board
RV1 14-6
RV2 14-5
RV3 14-5

7-2. EQUIPMENT REQUIRED

Oscilloscope
Equivalent product: 2445 or 2465/Tektronix
Band width: more than 150MHz

Digital Voltmeter
Equivalent product: 3435A/Hewlett Packard
Effective digits: more than 5 digits
Acculacy: 0.02% ± 1count

DC Ammeter
Range: 10A

Test Signal Generator

NTSC

Equivalent product: (1) 1410/Tektronix with the following plug-in units
SPG2 SYNC generator
TSG1 Color bar generator
TSG3 Linearity generator
TSG6 Multiburst generator
(2) TSG170D/Tektronix

PAL

Equivalent product: (1) 1411/Tektronix with the following plug-in units
SPG12 SYNC generator
TSG11 Color bar generator
TSG13 Linearity generator
TSG16 Multiburst generator
(2) TSG-273/Tektronix

Vectorscope / Waveform Monitor

NTSC

Equivalent Product: 1750/Tektronix

PAL

Equivalent product: 1751/Tektronix

Waveform Monitor (When Vectorscope is separately prepeared)
Equivalent product: 1485R/Tektronix

Monitor

NTSC

Equivalent product: BVM-1910 or BVM-2010/SONY

PAL

Equivalent product: BVM-2010P/SONY

Audio Oscillator / Analyzer
Equivalent product: TM5006/Tektronix with the following plug-in units
SG5010 Oscillator
AA5001 Analyzer

Spectrum Analyzer
Equivalent product: 8568B/Hewlett Packard

Video Noise Meter
Equivalent product: UPSF2/Rohde & Schwarz

Frequency Counter
Equivalent product: 5315/Hewlett Packard

AC Current Probe
Equivalent product: P6022/Tektronix
Band width: more than 100MHz

Extension Board, EX-341
SONY Part No. A-6001-038-A

This is used for checking and repairing the plug-in boards that are installed in the processor block.(One board is supplied with equipment.)

Extension Board, EX-185
SONY Part No. A-6001-015-A

This is used for checking and repairing the plug-in boards that are installed in the card rack block.(One board is supplied with equipment.)

Extension Board, EX-241
SONY Part No. A-6025-144-A

This is used for checking and repairing REC-11 board.(One board is supplied with equipment.)

Alignment Tape
NTSC
ER2-2NTSC Mechanical Alignment
SONY Part No. 8-960-071-12
ER5-2NTSC Electrical Alignment
SONY Part No. 8-960-071-02

PAL
ER2-2PAL Mechanical Alignment
SONY Part No. 8-960-071-62
ER5-2PAL Electrical Alignment
SONY Part No. 8-960-071-52

IC Test Clip
Type TC-16: SONY Part No. J-6041-770-A
Type TC-20: SONY Part No. J-6041-780-A

Manufactured by: AP PRODUCTS INCORPORATED

P.O. Box 697, 72 Corwin Drive,
Painesville, Ohio 44077, U.S.A.
Phone: (216) 354-2101

When connecting the test probe to the terminal of DIP integrated circuit for check and alignment, these clips are convenient. Type TC-16 is used for DIP 14-pin or 16-pin IC and Type TC-20 for 18-pin or 20-pin IC.

Adjustment Driber 1.3mm(ceramic)
SONY Part No. 7-721-052-81

This is used for alignment of the variable resistor.

7-3. WAY OF DESCRIBING ELECTRIC ALIGNMENT PARTS NOTATION

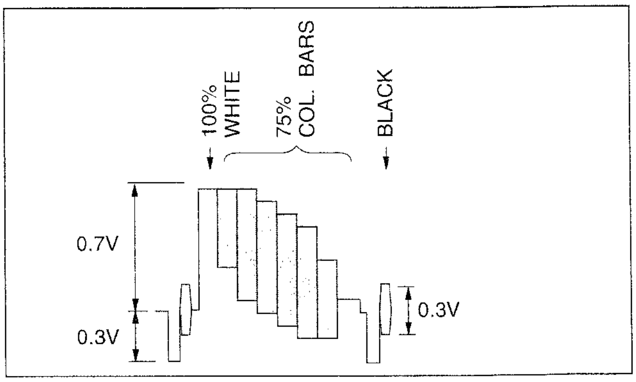
The meaning of reference such as "RV1/PS-187 (E3)" in this manual is as follows:

RV1 → Reference number
PS-187 → Board name
E3 → Location on printed circuit board

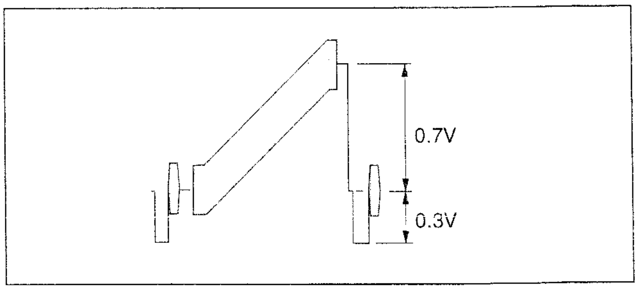
7-4. EXTERNAL TEST SIGNALS (WHEN USING SIGNAL GENERATOR)

- The test signal to be used must be satisfied with the SC-H 0 degree.

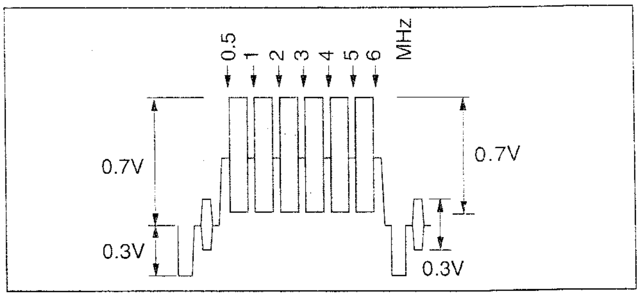
1. COLOR BARS


100% WHITE
75% COL. BARS
BLACK
0.7V
0.3V
0.3V

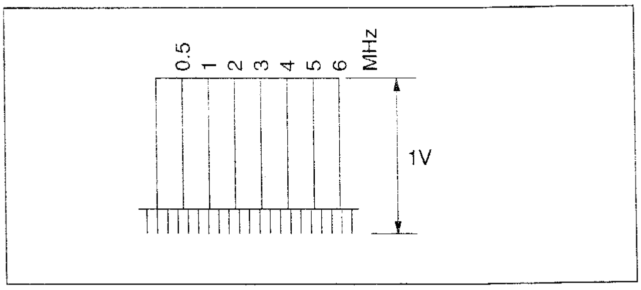
2. RAMP LENEARITY



3. H-SWEEP

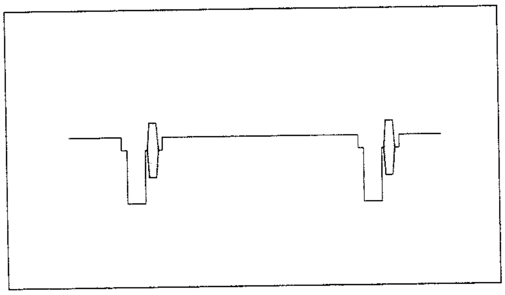

0.5
1
2
3
4
5
6
MHz
0.7V
0.3V
0.7V
0.3V

4. V-SWEEP

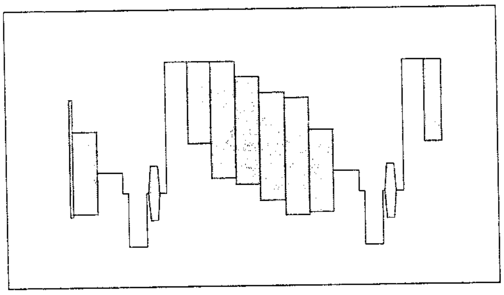

0.5
1
2
3
4
5
6
MHz
1V

7-5. INTERNAL TEST SIGNALS

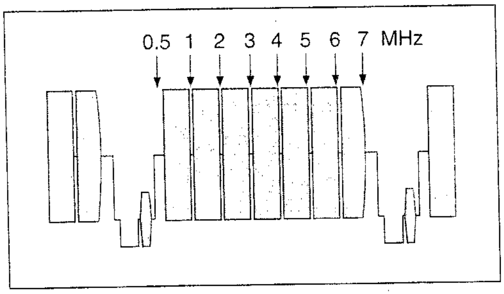
1. **BB** (Black burst)



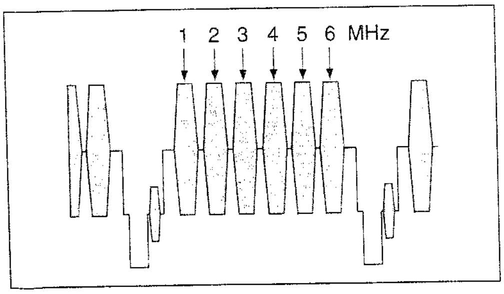
2. **CB W/RED** (75% Color bars)



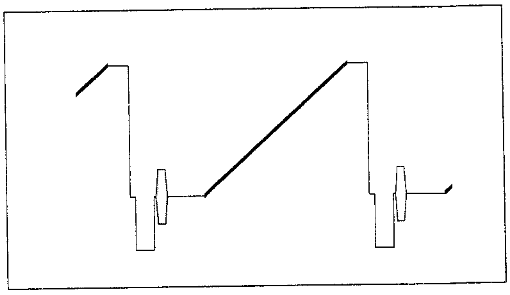
3. **SWEEP**


0.5
1
2
3
4
5
6
7
MHz

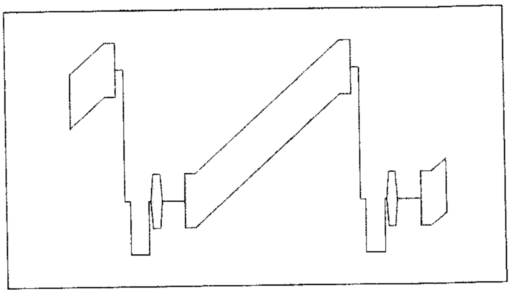
4. **MB** (Multiburst)



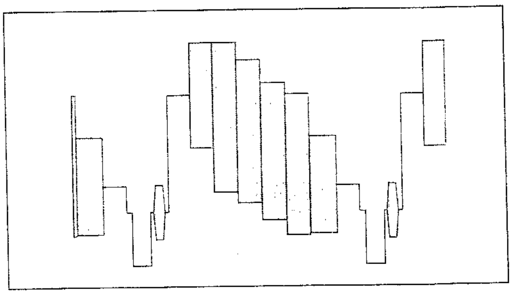
5. **Y RAMP**



6. **MOD RAMP** (Modulated ramp)

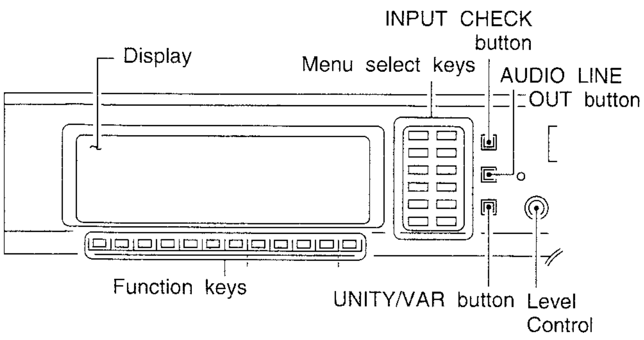


7. **CB FULL** (100% Color bars)



7-6. HOW TO ACCESS MENU

BKDV-101


INPUT CHECK button
Display
Menu select keys
AUDIO LINE OUT button
Function keys
UNITY/VAR button
Level Control

Access menu mentioned in the electrical alignment sections as follows:

Example–1:

HOME : F11 (CONTROL) → LOCAL

F3 (REC REF) → INPUT

Example–2:

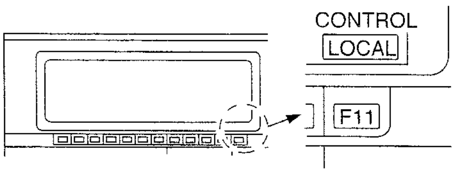
VIDEO IN : F1 (ANALOG V) → UNITY

Example–3:

AUDIO OUT : F7 (MONI L) → Some one of DA-1 to DA-4

Example–1:

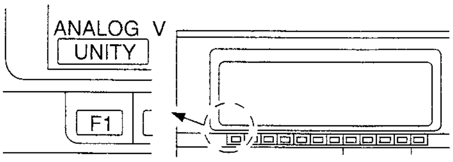
1. Press HOME key in the menu select keys. The display is changed to the HOME menu.
2. Press F11 key in the function keys. The following display is indicated:


CONTROL
LOCAL
F11

3. Confirm that "LOCAL" is indicated on the display. If "REMOTE" is indicated, press F11 key again to indicate the "LOCAL".
4. Next, press F3 key while pressing F key. Access the menu in the same way as items 2 and 3.

Example–2:

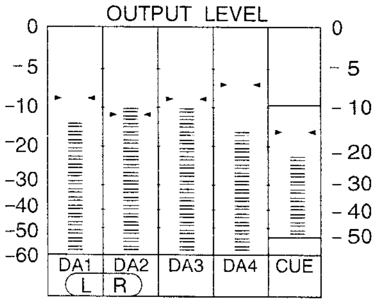
1. Press VIDEO IN key in the menu select keys. The display is changed to the VIDEO IN menu.
2. Press F1 key in the function keys. The following display is indicated:


ANALOG V
UNITY
F1

3. Confirm that "UNITY" is indicated on the display. If "VTR" is indicated, press UNITY/VAR button to indicate the "UNITY".

Example–3:

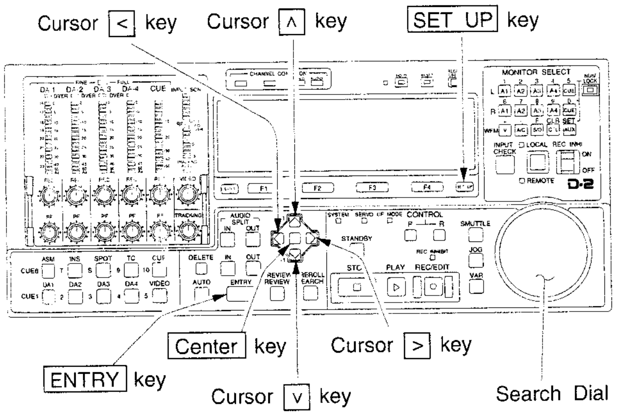
1. Press AUDIO OUT key in the menu select keys. The display is changed to AUDIO OUT menu and the Audio Level Meter (OUTPUT LEVEL) is indicated as follows:


OUTPUT LEVEL
0
-5
-10
-20
-30
-40
-50
-60
0
- 5
- 10
- 20
- 30
- 40
- 50
DA1
DA2
DA3
DA4
CUE
L
R

2. Press F7 key in the function keys. "L" mark moves DA1 → DA2 → DA3 → DA4 → CUE in the order. After moving to CUE, the mark returns to DA1 position again. With this way, set the "L" mark to one of DA1 to DA4 positions.

BKDV-201/200

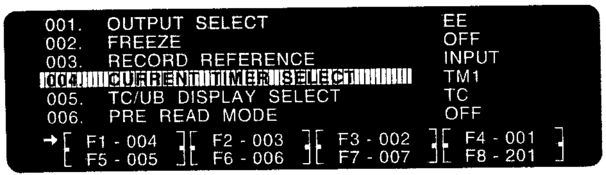
The cursor keys are used to access all the menu items. Only the menus assigned to function keys can be directly entered by pressing the function keys.



1. Press the keys on the control panel in the following sequence.

① SET UP

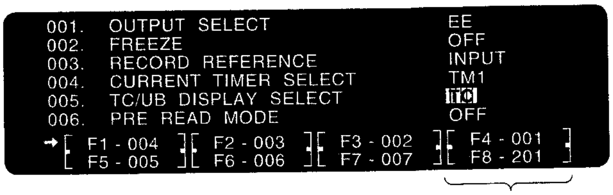
② Scroll through the menus to select the menu to be accessed. (Selection of menu categoly to be accessed)
ENTRY + Search dial
or ENTRY + ∧ Key and ∨ Key
(Selection of menu to be accessed)
Search dial
or ∧ Key and ∨ Key
Note: TEST menu → ENTRY + Center +Search dial



```
001.  OUTPUT SELECT                      EE
002.  FREEZE                             OFF
003.  RECORD REFERENCE                   INPUT
004.  CURRENT TIMER SELECT               TM1
005.  TC/UB DISPLAY SELECT               TC
006.  PRE READ MODE                      OFF
→[ F1 - 004 ][ F2 - 003 ][ F3 - 002 ][ F4 - 001 ]
 [ F5 - 005 ][ F6 - 006 ][ F7 - 007 ][ F8 - 201 ]
```

menu to be accessed

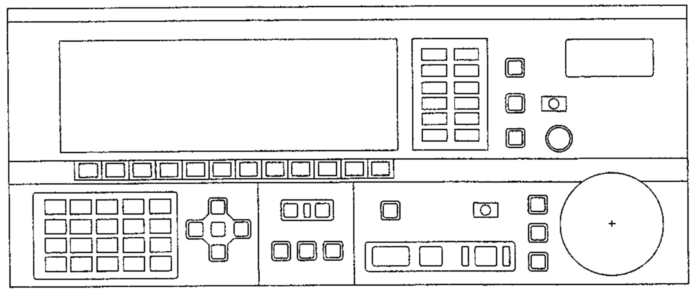
2. Press > key to move to the column on the right where the actual menu content is shown. The select menu is shown in reversed charaters. Select the desired with the ∧ key and ∨ key, or the search dial.



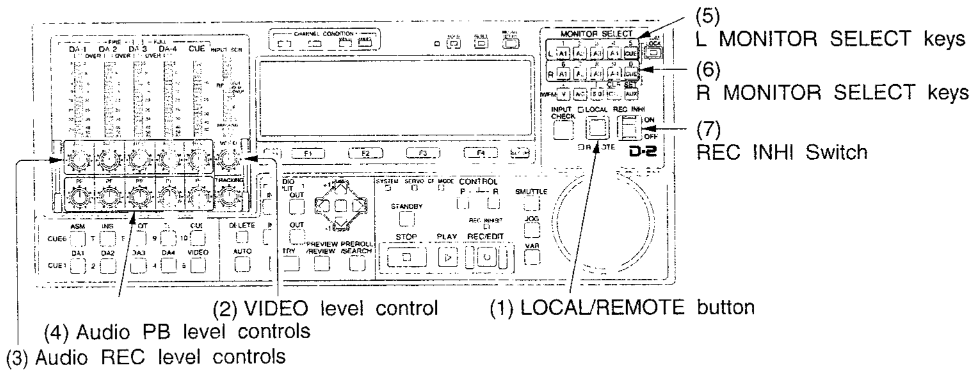
```
001.  OUTPUT SELECT                      EE
002.  FREEZE                             OFF
003.  RECORD REFERENCE                   INPUT
004.  CURRENT TIMER SELECT               TM1
005.  TC/UB DISPLAY SELECT               TC
006.  PRE READ MODE                      OFF
→[ F1 - 004 ][ F2 - 003 ][ F3 - 002 ][ F4 - 001 ]
 [ F5 - 005 ][ F6 - 006 ][ F7 - 007 ][ F8 - 201 ]
```

menu item

3. After menu content is displayed, return to the column on the left by pressing < key.
(Select other menus in the same way.)
To exit menu, press SET UP key.



BKDV-101


(5) L MONITOR SELECT keys
(6) R MONITOR SELECT keys
(7) REC INHI Switch
(2) VIDEO level control
(1) LOCAL/REMOTE button
(4) Audio PB level controls
(3) Audio REC level controls

BKDV-201/200

The settings of HOME and HOME/EDIT (MANUAL/AUTO) menu are common at all alignment.

BKDV-101	**BKDV-201/200/202**
HOME: F3 (REC REF) → INPUT F8 (PRE READ) → OFF F11 (CONTROL) → LOCAL F12 (SET UP) → F11 (REC INH) → OFF	SET UP [HOME/EDIT (MANUAL/AUTO)] 003 RECORD REFERENCE → INPUT 006 PRE READ MODE → OFF 027 RECORD INHIBIT → ALL LOCAL/REMOTE button (1) → LOCAL REC INH switch (7) → OFF
VIDEO IN: F1 (ANALOG V) → UNITY F7 (VIDEO) → ANALOG	SET UP [VIDEO IN/OUT] 202 VIDEO INPUT SELECT → ANALOG VIDEO level control for unity gain. (2) → Push in (UNITY)
VIDEO OUT: F1 (VIDEO) → UNITY F2 (CHROMA) → UNITY F3 (HUE) → UNITY F4 (SET UP) → UNITY F5 (V PHASE) → UNITY F11 (CF PULSE) → OUT FRM	SET UP 204 VIDEO LEVEL → UNITY [VIDEO IN/OUT] 205 CHROMA LEVEL → UNITY 206 HUE, B/C PHASE → UNITY 207 SET UP/BLACK LEVEL → UNITY 208 VIDEO PHASE → UNITY 209 CF PULSE SELECT → OUT CF
AUDIO IN: F1 (DA-1) → UNITY F2 (DA-2) → UNITY F3 (DA-3) → UNITY F4 (DA-4) → UNITY F5 (CUE) → UNITY F7 (EMPHASIS) → OFF	Push in the Audio REC level control, DA-1 of (3) for unity gain. (UNITY) Push in the Audio REC level control, DA-2 of (3) for unity gain. (UNITY) Push in the Audio REC level control, DA-3 of (3) for unity gain. (UNITY) Push in the Audio REC level control, DA-4 of (3) for unity gain. (UNITY) Push in the Audio REC level control, CUE of (3) for unity gain. (UNITY) SET UP [303 RECORDING EMPHASIS → OFF] [AUDIO IN/OUT]
AUDIO OUT: F1 (DA-1) → UNITY F2 (DA-2) → UNITY F3 (DA-3) → UNITY F4 (DA-4) → UNITY F5 (CUE) → UNITY F7 (MONI L) → Any one of DA1 ~ DA4 F8 (MONI R) → Any one of DA1 ~ DA4	Push in the Audio PB level control, DA-1 of (4) for unity gain. (UNITY) Push in the Audio PB level control, DA-2 of (4) for unity gain. (UNITY) Push in the Audio PB level control, DA-3 of (4) for unity gain. (UNITY) Push in the Audio PB level control, DA-4 of (4) for unity gain. (UNITY) Push in the Audio PB level control, CUE of (4) for unity gain. (UNITY) Push in the Audio L MONITOR SELECT key, any one of DA-1 of (5) through DA-4. Push in the Audio R MONITOR SELECT key, any one of DA-1 of (6) through DA-4.
TC & CHR: F1 (SOURSE) → INT F10 (SUPER) → OFF	SET UP 401 TCG SOURSE SELECT → INT-TC [TC & CHARACTER] 409 SUPER IMPOSE DISPLAY → OFF
SET UP/VIDEO IN: F1 (IN CF) → FIX	SET UP 217 INPUT CF DETECT MODE → FIX [VIDEO IN/OUT]
SET UP/VIDEO OUT: F1 (OUT REF) → INPUT F4 (OUT REF CF) → FIX F8 (VIDEO 3) NON → COMP	SET UP 210 VIDEO OUT REFERENCE → INPUT [VIDEO IN/OUT] 213 OUTPUT CF DETECT MODE → FIX 214 VIDEO-3 OUTPUT SELECT → COMP
SET UP/AUDIO IN: F1 (DA-1) → ANALOG F2 (DA-2) → ANALOG F3 (DA-3) → ANALOG F4 (DA-4) → ANALOG F5 (CUE) → LINE F + F1 Selects the audio input signals to be recorded on the digital audio channels (DA-1 through DA-4).	SET UP [AUDIO IN/OUT] 306 DA-1 INPUT SELECT → ANALOG 307 DA-2 INPUT SELECT → ANALOG 308 DA-3 INPUT SELECT → ANALOG 309 DA-4 INPUT SELECT → ANALOG 310 CUE INPUT SELECT → LINE SET UP [305 DA ALL INPUT SELECT ANALOG] Selects the audio input signals to be recorded on the digital audio channels (DA-1 through DA-4).
TEST	ENTRY + center + Search dial

SECTION 8

POWER SUPPLY ALIGNMENT

8-1. ALIGNMENT PREPARATION

[Alignment Sequence]

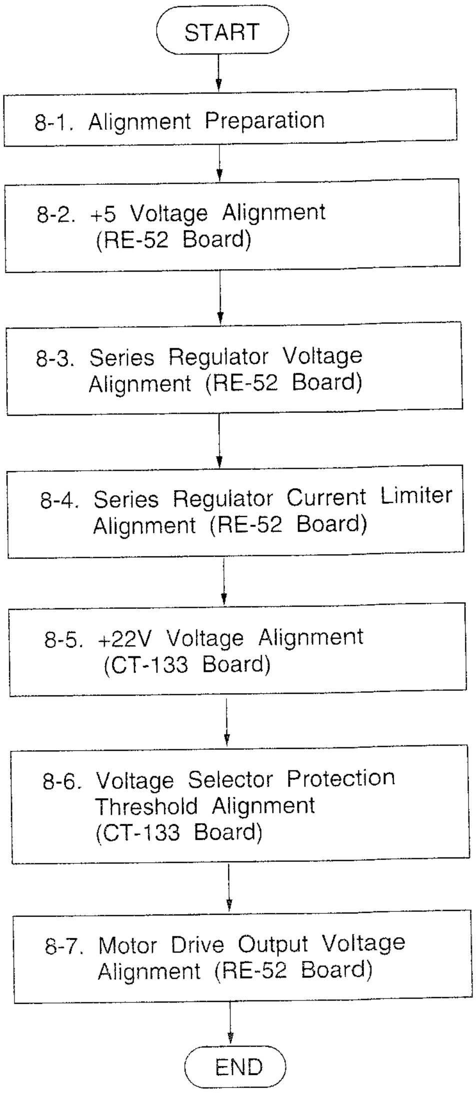
- Read Section 2-5 "Notes on Power Unit" before proceeding to inspect and align the power supply block.
- Avoid the alignment of the supply voltage unless it is positively evident that alignment is necessary.
- When the following variable resistors have to be replaced, first set them to the following positions before attempting alignment.

CT-133 Board	
RV1	Clockwise fully
RV2	Mechanical center

RE-42 Board	
RV1	Mechanical center
RV2	Clockwise fully
RV3	Mechanical center
RV4	Clockwise fully
RV5	Mechanical center
RV6	Clockwise fully
RV7	Mechanical center
RV9	Clockwise fully
RV10	Mechanical center

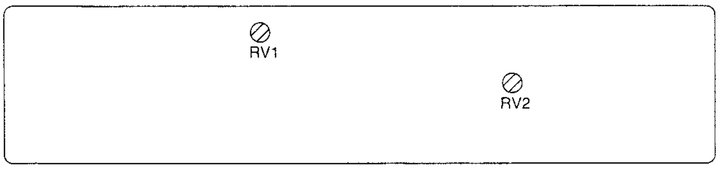
[Equipments Required]

- Digital Voltmeter (Equivalent Product: 3435/Hewlett Packard)
- Oscilloscope (Equivalent Product: 2445 or 2465/Tektronix)
- DC Ammeter (Range: 10 A)
- Extension Board: EX-185 (Supplied Accessary)


START
8-1. Alignment Preparation
8-2. +5 Voltage Alignment (RE-52 Board)
8-3. Series Regulator Voltage Alignment (RE-52 Board)
8-4. Series Regulator Current Limiter Alignment (RE-52 Board)
8-5. +22V Voltage Alignment (CT-133 Board)
8-6. Voltage Selector Protection Threshold Alignment (CT-133 Board)
8-7. Motor Drive Output Voltage Alignment (RE-52 Board)
END

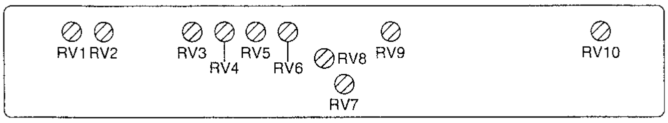
[Location]

CT-133 Board



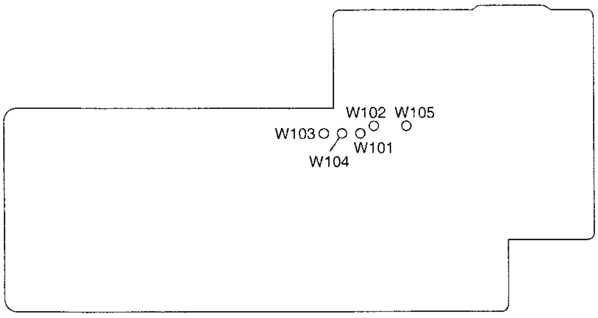
A SIDE

RE-52 Board


RV1
RV2
RV3
RV4
RV5
RV6
RV8
RV9
RV7
RV10

COMPONENT SIDE

PS-256 Board

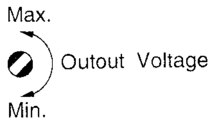

W102
W105
W103
W101
W104

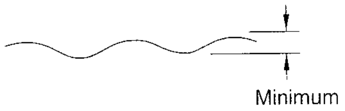
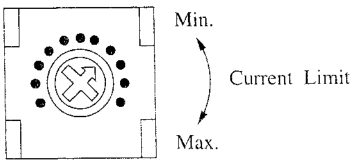
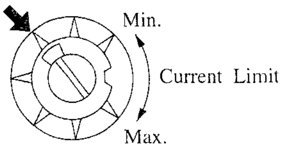
A SIDE

8-2. +5 V VOLTAGE ALIGNMENT (RE-52 Board)

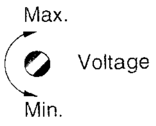
<table>
<tr><th>Conditions for alignment</th><th>Specifications</th><th>Adjustments</th></tr>
<tr><td>STEP1.
VTR:STOP
• Switch the power on.

• Digital voltmeter</td><td>CN721 pin-1/MB-379 (A1)

+5.00±0.02 Vdc</td><td>⊘RV7/RE-52 (F1)
 </td></tr>
<tr><td>STEP2.
• Align the ripple to minimum while observing the oscilloscope.

• Oscilloscope
50 mV/DIV
TIME: 5 mS/DIV</td><td>CN721 pin-1/MB-379 (A1)
 </td><td>⊘RV8/RE-52 (F1)</td></tr>
<tr><td colspan="3">Note: Adjust ⊘RV9/RE-52 (E1) as follows only when it is replaced.
Otherwise, ⊘RV9 should not be touched.
• Perform the alignment in STEP 3 and 4 if the following maximum load resistor is available.
Perform STEP 5 if it is not available.
(Resistance: 0.14 to 0.16 ohm
Rated power: more than 180 W.)</td></tr>
<tr><td>STEP3.
• Switch the power off and disconnect CN721.
• Turn ⊘RV9/RE-52 (E1) Clockwise fully.
• Connect the maximum load resistor between W101 and W103 on PS-256.
• Switch the power on and check on the oscilloscope that a voltage of approximately +5 V is output to W103.</td><td>• Turn ⊘ RV9/RE-52 (E1) gradually counterclockwise and stop at the point where W103 output drops sharply.</td><td>⊘RV9/RE-52 (E1)
• Turn slowly</td></tr>
<tr><td>STEP4.
• Switch the power off and connect CN721.</td><td></td><td></td></tr>
<tr><td>STEP5.</td><td>(S/N 10001 and higher)
• Adjust ⊘RV9/RE-52 (E1) to the position indicated in the figure below. (4 scale units from fully clockwise position)

(Old version)
• Adjust ⊘RV9/RE-52 (E1) to the position indicated in the figure below. (3 scale units from fully clockwise position)
 </td><td>⊘RV9/RE-52(E1)</td></tr>
</table>

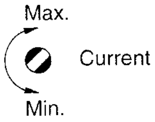
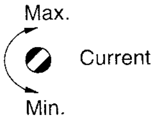
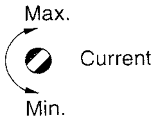
8-3. SERIES REGULATOR VOLTAGE ALIGNMENT (RE-52 Board)

Conditions for alignment	spcifications	Adjustments
VTR:STOP	CN721 pin-15/MB-379 (A1) +12.00±0.05 Vdc	⊘RV1/RE-52 (L1)
	CN721 pin-12/MB-379 (A1) −12.00±0.05 Vdc	⊘RV3/RE-52 (J1)
	CN721 pin-9/MB-379 (A1) −5.00±0.02 Vdc	⊘RV5/RE-52 (H1)
• Digital voltmeter		

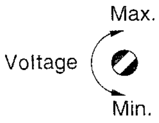
8-4. SERIES REGULATOR CURRENT LIMITER ALIGNMENT (RE-52 Board)

Note: Adjust ⊘RV2, 4 and 6 /RE-52 as follows only when they are replaced.
Otherwise, ⊘RV2, 4 and 6 should not be touched.

Conditions for alignment	Specifications	Adjustments
STEP1. • Switch the power off and disconnect the following board: AD-73 board EN-99 board DE-36/37 board PR-157/163 board DIF-05 board (Optional board) PP-34 board (Optional board) REC-11 board VM-05 board SSP-07 board EQ-29 board ⎫ AE-15 board ⎬ * DT-16 board ⎭		
STEP2. • Install EX-185 extension board into any of the above (marked with *) three circuit boards slot and switch on the power.		

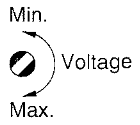
Conditions for alignment	Specifications	Adjustments
STEP3. VTR:STOP • Connect the + terminal of the DC ammeter to the +12 V TP terminal on EX-185 extension board and the − terminal to the GND TP terminal.	Current Value = 3.6±0.1A	⊘ RV2/RE-52 (K1) (+12 V Current limiter alignment) 
STEP4. • Connect the + terminal of the DC ammeter to the GND TP terminal on EX-185 extension board and the − terminal to the −12 V TP terminal.	Current Value = 2.5±0.1A	⊘ RV4/RE-52 (J1) (−12 V Current limiter alignment) 
STEP5. • Connect the + terminal of the DC ammeter to the GND TP terminal on EX-185 extension board and the − terminal to the −5 V TP terminal.	Current Value = 4.8±0.1A	⊘ RV6/RE-52 (H1) (−5 V Current limiter alignment) 
STEP6. • Switch the power off, remove EX-185 extension board and install the board which was removed in Step 1.		

8-5. +22 V VOLTAGE ALIGNMENT (CT-133 Board)

Conditions for alignment	Specifications	Adjustments
STEP1. • Switch the power off and disconnect the connector CN721 from the MB-379 board.		
STEP2. VTR:STOP • Switch the power on. • Digital voltmeter	CN105 pin-1A/PS-256 (A5) +22.5±0.1 Vdc	⊘ RV2/CT-133 (A2) 
STEP3. • Switch the power off and re-connect the connector CN721 which was disconnected in Step 1.		

8-6. VOLTAGE SELECTOR PROTECTION THRESHOLD ALIGNMENT (CT-133 Board)

Note: Adjust ⊘RV1/CT-133 (B1) or D8/CT-133 (B1) as follows only when it is replaced.
Otherwise, ⊘RV1 should not be touched.

Conditions for alignment	Specifications	Adjustments
VTR:STOP • Digital voltmeter	TP3/CT-133 (B1) 4.80±0.01 Vdc	⊘RV1/CT-133 (B1) 

8-7. MOTOR DRIVE OUTPUT VOLTAGE ALIGNMENT (RE-52 Board)

Conditions for alignment	Specifications	Adjustments
VTR:STOP • Digital voltmeter	CN105 pin-3A, 3Bor 4A/PS-256(A5) +15.0±0.1 Vdc	⊘RV10/RE-52 (B1)

SECTION 9
TAPE TRANSPORT SYSTEM ALIGNMENT

This section describes how to adjust the tape path system.
When the parts that affect the tape path are replaced or when the tape does not run normally, follow this section to locate the source of the trouble and to remedy it.

Cautions Before starting Tape Path System Alignment

Followings are the particular cautions to be observed in the tape path system adjustment.
Be sure to read through them before performing the adjustment.

1. Tape path system alignment

This alignment consists of three adjustments as follows.

1) Tracking Adjustment
   - Tracking adjustment (linearity)
   - Stationary R/P head azimuth adjustment
   - Stationary R/P head height adjustment
   - Stationary CONFIDENCE head height adjustment
   - CTL head position adjustment
   - PG (drum PG) phase adjustment
2) Self record/playback RF envelope waveform check
3) Tape path adjustment
   Cautions in each adjustments are described as follows.

2. Cautions in the tape path system alignment

The Alignment tape to be used;

> The Alignment tape for tracking adjustments on this unit is ER2-2. Do not use ER2-1 as accurate adjustments cannot be performed.
> ER2-2 Sony Part No.:8-960-071-12

1) Tracking Adjustment

(1) Tracking adjustment (linearity)

Purpose of the tracking adjustment is to make the rotary head trace the track correctly and to get the best tape-to-rotary head contact. (See Fig. 9-1, which shows the tape pattern of D-2 format.)

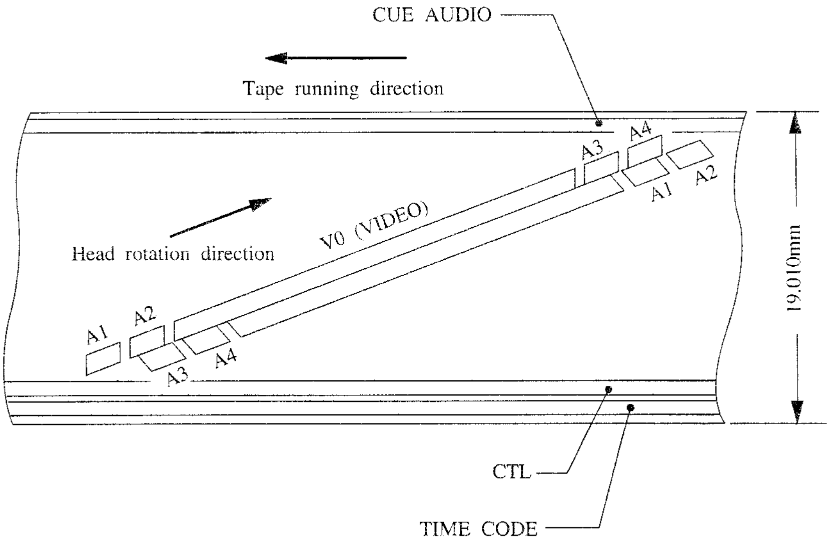


Fig. 9-1. D-2 Tape Pattern

This adjustment is performed by adjusting the four guides (S1, S2, T1, T2) on the slider base at the tape entrance/exit side of the drum, while playing back the ER2-2 and observing the RF envelope. (See Fig. 9-2.)

Adjusting these guides has a great effect on the tracking adjustment of the RF envelope at the tape entrance/exit side shown in marked ◌ portions of Fig. 9-2.
Also, the marked ◌ portions are assigned for the digital audio tracks (A1 to A4ch) shown in Fig. 9-1. If these guides are incorrectly adjusted, audio interchangeability becomes poor.

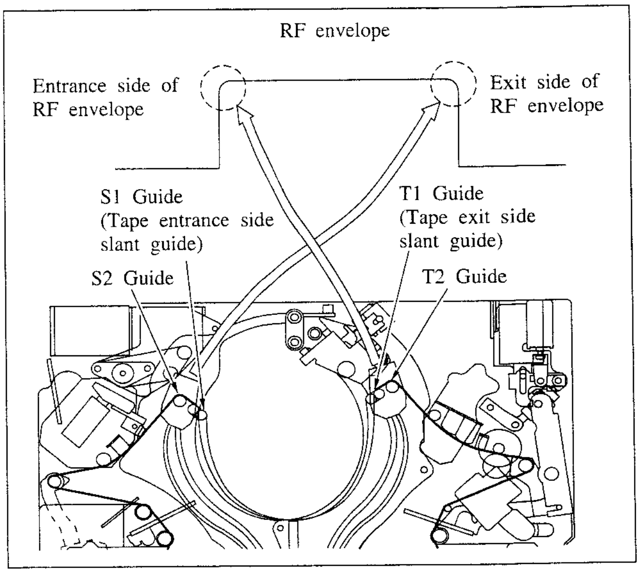

RF envelope
Entrance side of RF envelope
Exit side of RF envelope
S1 Guide (Tape entrance side slant guide)
T1 Guide (Tape exit side slant guide)
S2 Guide
T2 Guide

Fig. 9-2. RF Envelope Adjustment

ER2-2 is the Alignment tape for tracking adjustment. For this purpose low frequency is recorded on the tape, to avoid a poor RF envelope caused by spacing loss.
Perform the guide adjustment so that the RF envelope can be flat, and the straightness is the same straightness of ER-2-2. This results that the straightness adjustment has properly been made.

Be sure to use 0 - 15min portion of ER2-2 for adjusting the guides.
Use 15 - 20min portion for adjusting the CTL position and the PG phase.

Also, there is the case in which the RF envelope in self record/playback is worse than the one obtained by playing back the ER2-2. (See Fig. 9-3.)
This means that the RF envelope becomes poor due to spacing loss caused by the high frequency recorded.

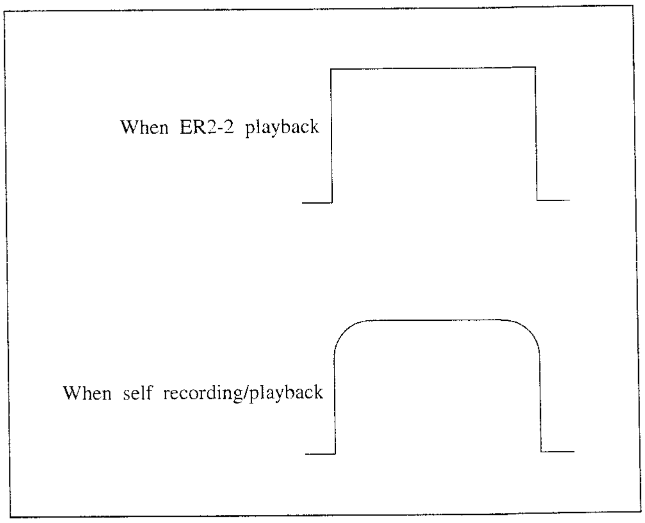

When ER2-2 playback
When self recording/playback

Fig. 9-3. Self Record/Playback RF Envelope

As observing the above described phenomenon, and if the guide adjustments are attempted to improve the self record/playback RF envelope in the self record/playback mode, the result will be the tracking error at the entrance/exit side as shown in Fig. 9-4.
***This causes loss of interchangeability of the tape.**

Therefore, never ignore the RF envelope of the alignment tape.

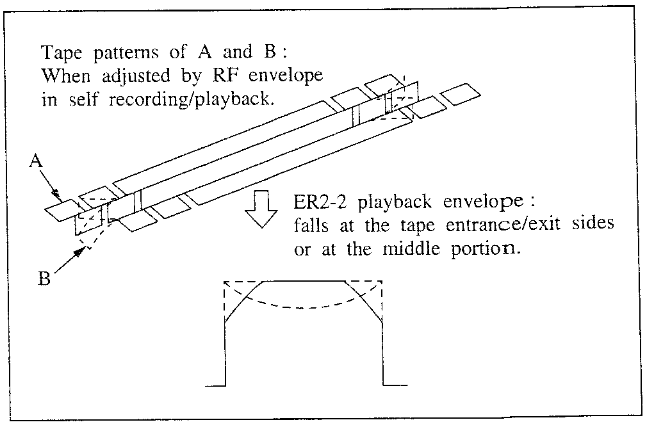

Tape patterns of A and B : When adjusted by RF envelope in self recording/playback.
A
B
ER2-2 playback envelope : falls at the tape entrance/exit sides or at the middle portion.

Fig. 9-4. Self Record/Playback Tape Pattern

(2) Following problems will be resulted when tracking adjustment is incorrect

① In case that S2, T2 guides height adjustment is NG

Basically, S2, T2 guides are for adjusting the tracking (linearity) at the entrance/exit side of ER2-2 RF envelope . (See Fig. 9-2)

As seen in Fig. 9-5, audio sectors are placed at both edges of the helical track in D-2 format, and correspond to the entrance and exit side of the RF envelope.
Bad adjustment of the T2 guides height results in tracking error shown in Fig. 9-6 when editing the digital audio insert. And the shape of RF envelopes changes between inserted portion and recorded portion. This makes audio error rate bad.

In adjusting the S2/T2 guides height, be sure to use ER2-2 and be careful not to lift the tape upward or giving too much downward pressure.

② In case the S1 guide (slant guide) adjustment is NG

The S1 guide should be adjusted to minimize a fluctuation at the exit side (tape entrance side) of the RF envelope as shown in Fig. 9-7 and to make good contact between the tape and drum rabbet guide. The S1 guide has no guide flange which controls tape running and is adjusted by changing the slant of the guide.
The S1 guide should be adjusted to stretch the lower part of the tape.

If the S1 guide slant adjustment is no good, a tracking error occurs due to the fluctuation at the exit side of RF envelope, and the specification of digital audio becomes worse.

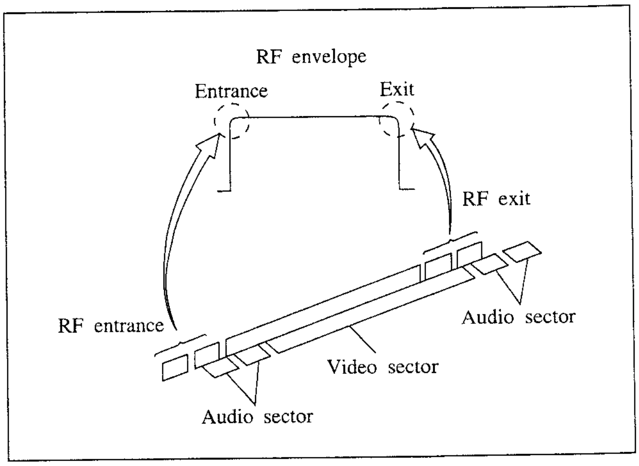

RF envelope
Entrance
Exit
RF exit
RF entrance
Audio sector
Video sector
Audio sector

Fig. 9-5. Audio Sectors Placement

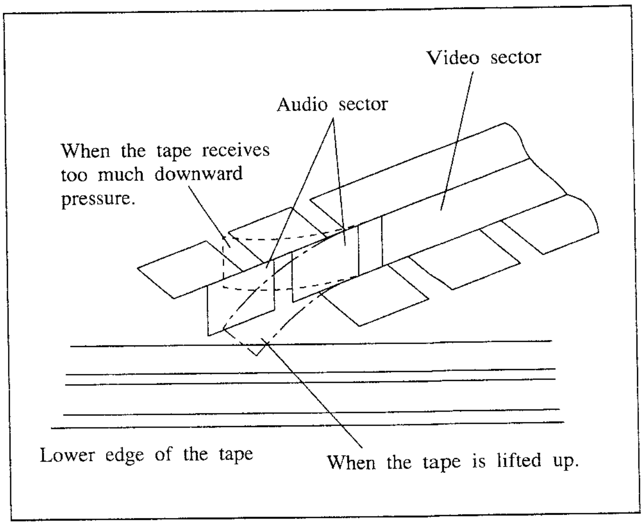

Video sector
Audio sector
When the tape receives too much downward pressure.
Lower edge of the tape
When the tape is lifted up.

Fig. 9-6. In Case T2 Guide Height Adjustment is NG

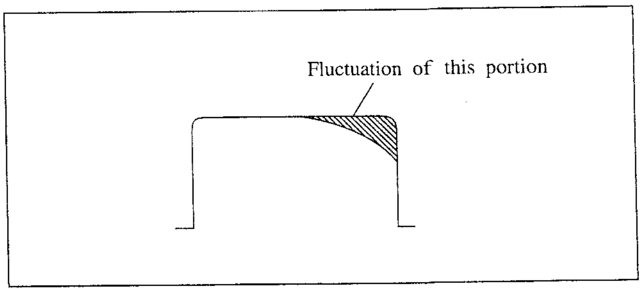

Fluctuation of this portion

Fig. 9-7. In Case that S1 Guide Slant Adjustment is NG

③ In case the T1 guide (slant guide) adjustment is NG

As well as the S1 guide, the T1 guide has no guide flange which controls tape running. This guide is adjusted by changing the slantness in order to minimize the fluctuations at the entrance side of the RF envelope as shown in Fig. 9-8.

Like the S1 guide, the T1 guide is adjusted by changing the slantness of the guide.

The slant of the T1 guide is adjusted to stretch the lower section of the tape (lower protrusion).

If this guide adjustment is no good, a tracking error occurs due to the fluctuation at the entrance side of the RF envelope, and the performance of digital audio becomes worse.

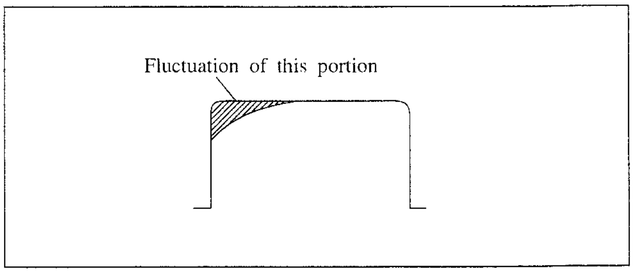


Fig. 9-8. In Case T1 Guide Adjustment is NG

④ In case the Stationary R/P head height adjustment is NG

This adjustment makes the head height of the longitudinal tracks (CUE, CTL and TIME CODE) equal as shown in Fig. 9-9.

If this adjustment is no good, a tracking error occurs as shown by the dotted line in Fig. 9-9.

If the tape is recorded in such condition, the interchangeability for playback by other VTRs is not guaranteed.

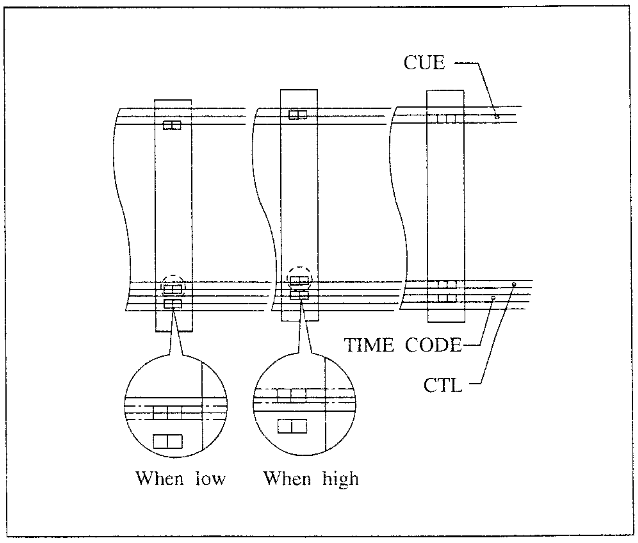


Fig. 9-9. In Case the Stationary Head Height Adjustment is NG

⑤ Unsatisfactory Stationary R/P Head Azimuth Adjustment

This adjustment determines slantness of the head in respect to the tape.

If this adjustment is imperfect, in some cases, azimuth loss will occur and the output of each track will decrease excessively.
Although the height is adjusted using the CTL as reference in step ④, the height of the CUE track becomes low as the head begins to slant. When this happens, there can be the cases where the VIDEO DATA section may be erased by the CUE track ERASE head.

⑥ Stationary CTL, T/C and CONFIDENCE Head Height Adjustment

If this adjustment is imperfect, the CTL or T/C recording error will occur during recording, and a warning will be given.

⑦ In case the CTL head position adjustment is NG

This adjustment is made in order to match the relative relation (distance) of CTL HEAD STAC versus PROGRAM DATA in the longitudinal direction of the tape.

Error rate of audio or video may be high when inserting in the poor CTL position. For example, in the digital audio editing as shown in Fig. 9-10, when the A3/A4 chs. are inserted on a tape on which the A1/A2 chs. are already recorded, part of the A1/A2 chs. tracks are erased.
Therefore, the tracks will become narrow, and the resulting error rate becomes worse.

Therefore, this adjustment is important in order to secure tape format. Always perform the adjustment using ER2-2 (TC 15 to 20 min portion).

Note: After adjustment of the CTL head position, be sure to check the PG phase.

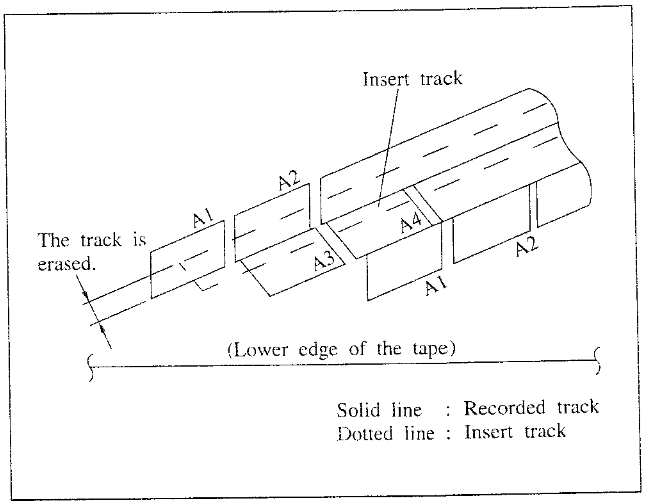


Fig. 9-10. In Case the CTL Head Position Adjustment is NG

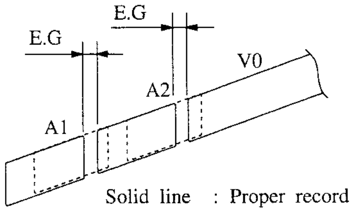
⑧ In case PG phase adjustment is NG

As shown in Fig. 9-1 1 track of the D2 tape format is divided into 5 sectors.

- Digital audio sector:A1, A2, A3, A4
- Digital video sector:V0

Each sector can be insert-edited separately.
So, there are edit-gaps between each sector as shown in Fig. 9-11 and signals can not interfere with each other.

However, if the PG phase adjustment is no good, the recording start point on the helical track will be shifted.



Solid line : Proper recording format
Dotted line : PG phase when NG
E.G : Edit gap

Fig. 9-11. In Case PG Phase Adjustment is NG

For example, if A1/A2 chs is insert-edited; the recording portion on the audio sector is shifted to the video sector and results in a part of the video sector being erased and the error rate becoming worse.

The edit gap between each sector is 19.4 µsec. But considering the interchangeability between tapes and the changes of the tape due to the elapse of time, it is determined that the specification of PG phase is 0±1 µsec.

Therefore, this adjustment is important in order to guarantee the tape format. Always perform the adjustment using ER2-2 (TC 15 to 20 min).

Note: After adjustment of the PG phase there is a case that the CTL position changed accordingly. Be sure to check the CTL head position. (Confirm that the center of the RF envelope is maximum when the TRACKING is set to FIX.)

2) Self record/playback RF envelope check

- In recording or playing back the tape, a spacing loss between the tape and rotary head occurs. The causes of spacing loss are complicatedly related to air film, change of tape path, tape tension, tape stiffness, head shape and head projection.
  Perform the self recording/playback envelope check to confirm that the recorded tape is usable practically without problem even with a spacing loss.

- As explained in the Tracking adjustment, a low frequency signal is used for RF envelope recording in the ER2-2. On the other hand, in the self recording/playback, a high frequency signal is recorded, so the RF envelope of self recording/playback looks worse than that of ER2-2 (Refer to Fig. 9-3)
  However, do not adjust the tracking by observing the self recording/playback RF envelope to make it better, while disregarding the adjusted tracking of the RF envelope of ER2-2.
  ***This causes loss of interchangeability of the tape.**

- Countermeasure in case the self recording/playback RF envelope is NG.
  The RF envelope may differ slightly in shape using tapes from different manufacturers.
  If it is still no good after the following countermeasures are performed, replace the tape and recheck.

(1) In case the RF envelope at the entrance side is very low. (See Fig. 9-12)

[Check procedure]

① Be sure to playback ER2-2 (TC 15 to 20 min portion) to confirm that the T1, T2 guides are adjusted correctly. This case is caused when the T2 guide height has been set too low.

↓

② If there is no problem with the T1, T2 guides adjustment, proceed then to a head projection check. If the head projection is 30 µm or less, replace the middle drum.

↓

③ If there is no problem with the T1, T2 guides adjustment or head projection, use it subject to that the error rate is no problem.
Even if the RF level becomes around 50%, there may be the case that error rate has no problem.

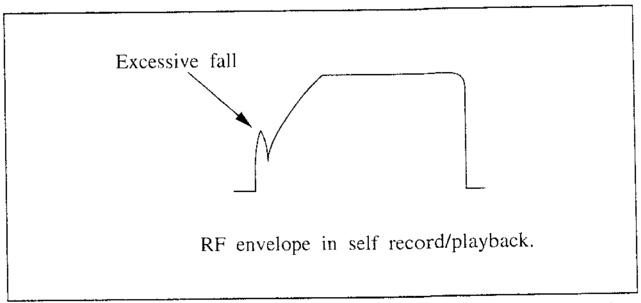


Fig. 9-12. The Level of the Envelope is Down at the Entrance Side

How to check the error rate

There are two ways to check the error rate. One is by using the channel condition which is displayed on the control panel. The other is using the TP (test point) on DE board which can show the error condition corresponding to the drop of RF envelope level. They are useful in checking whether a reduced level of the RF envelope has any influence on the error rate.

DE board TP1 : A/Cch error
TP2 : B/Dch error

Oscilloscope connect
CH1 : WFM OUT of the connector panel
CH2 : TP 1 or TP 2 on the DE board

Press the keys on the control panel in the following procedure.

BKDV-101 : Press [VIDEO OUT] key then [F8] key to set WFM to "ENV A/C". As a result, Ach and Cch will be OUTPUT.
If WFM is set to "ENV B/D", Bch and Dch will be output. And if WFM is set to "ENV ALL", the A, B, C and D channels will be output simultaneously.

BKDV-200 series :
Ach and Cch will be output by pressing [A/C] key of the monitor select key. Bch and Dch will be output by pressing [B/D] key. A, B, C and Dch will be output simultaneously by pressing [A/C] key with [B/D] key.

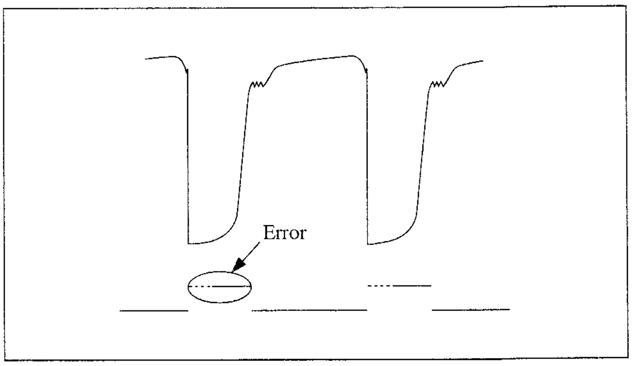


Fig. 9-13. Error Rate Check

(2) In case the RF envelope at the exit side is very low. (See Fig. 9-14.)

[Check procedure]

① Be sure to check the S1 and S2 guide height by playing back ER2-2 (TC 15 to 20 min).
If the S2 guide is set too low, this symptom appears.
↓

② If the S1 and S2 guides check shows no problem in the mechanism, check the head projection amount.
It is recommended that the middle drum be replaced if the amount of head projection is below 30 um.
↓

③ If the result of the S1 and S2 guides check and the head projection amount are satisfactory, check the error rate. If there is no problem, continue use.
There may be no problem with the error rate even if the amount of drop is 50%.

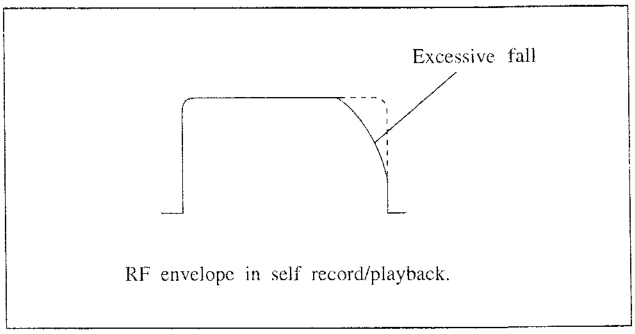


Fig. 9-14. The Level of the Envelope is Down at the Exit Side

3) Tape path adjustment

The tape path adjustment is carried out by adjusting the height of each guide as shown in Fig. 9-15.
The basic idea of this adjustment is to make the tape run from S side (Supply side) reel to T side (Take-up side) reel, so that tape receives no damage.
Commercially available cassette tapes without damage in the edge can be used in this adjustment.

Cautions in tape path adjustment are as follows.

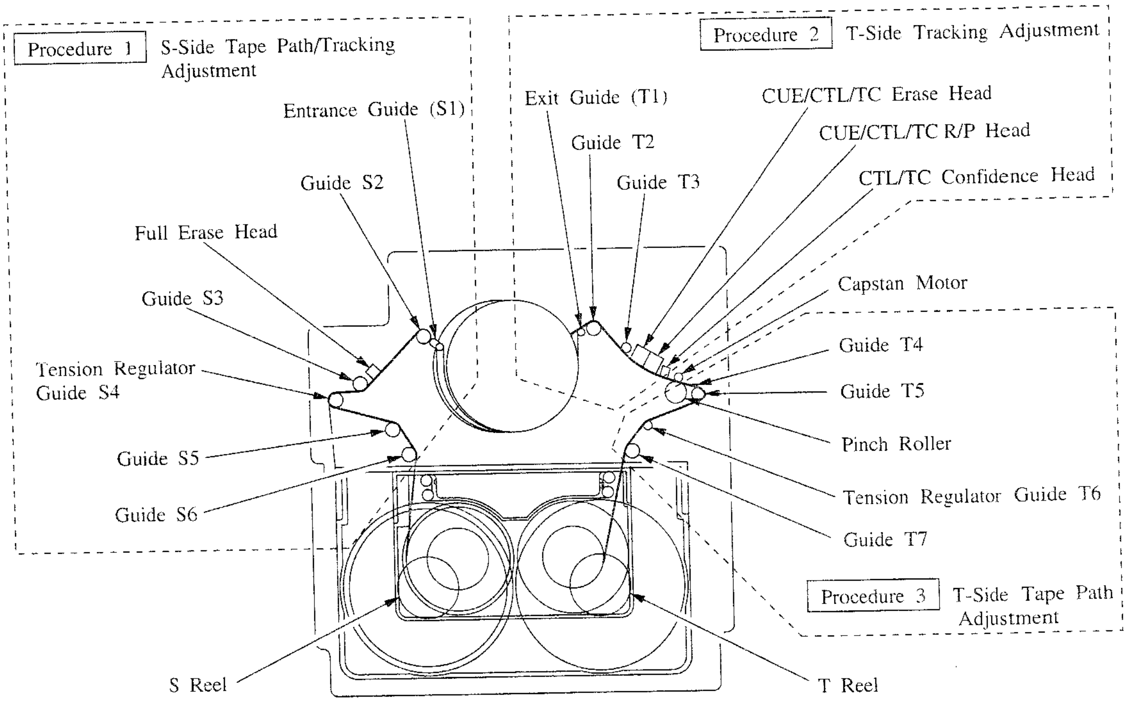
• Procedure

Perform the adjustment sequence according to procedures 1 through 3 in Fig. 9-15.

• Caution

1) NEVER adjust the S4 guide because it is the reference guide for the tape path system. If it is replaced or its height was changed by mistake, be sure to adjust the height of S4 guide using the following tools.
   - S4 Guide Width Adjustment Tool
     CONFI head adjustment plate
     SONY Part No. J-6257-140-A
   - Guide Height Adjustment Tool
     Master block (S3)
     SONY Part No. J-6253-340-A

2) Confirm the tape path in each modes of PLAY and VAR (-1).
   Basically, adjust the portion only where tape run shows the trouble. After the adjustment, be sure to perform the tape path check and the tracking check.


Procedure 1
S-Side Tape Path/Tracking Adjustment
Entrance Guide (S1)
Guide S2
Full Erase Head
Guide S3
Tension Regulator Guide S4
Guide S5
Guide S6
S Reel
Procedure 2
T-Side Tracking Adjustment
Exit Guide (T1)
Guide T2
Guide T3
CUE/CTL/TC Erase Head
CUE/CTL/TC R/P Head
CTL/TC Confidence Head
Capstan Motor
Guide T4
Guide T5
Pinch Roller
Tension Regulator Guide T6
Guide T7
Procedure 3
T-Side Tape Path Adjustment
T Reel

* The illustration is DVR-20/C20/20P. For DVR-28/28P, refer to Fig. 9-16.

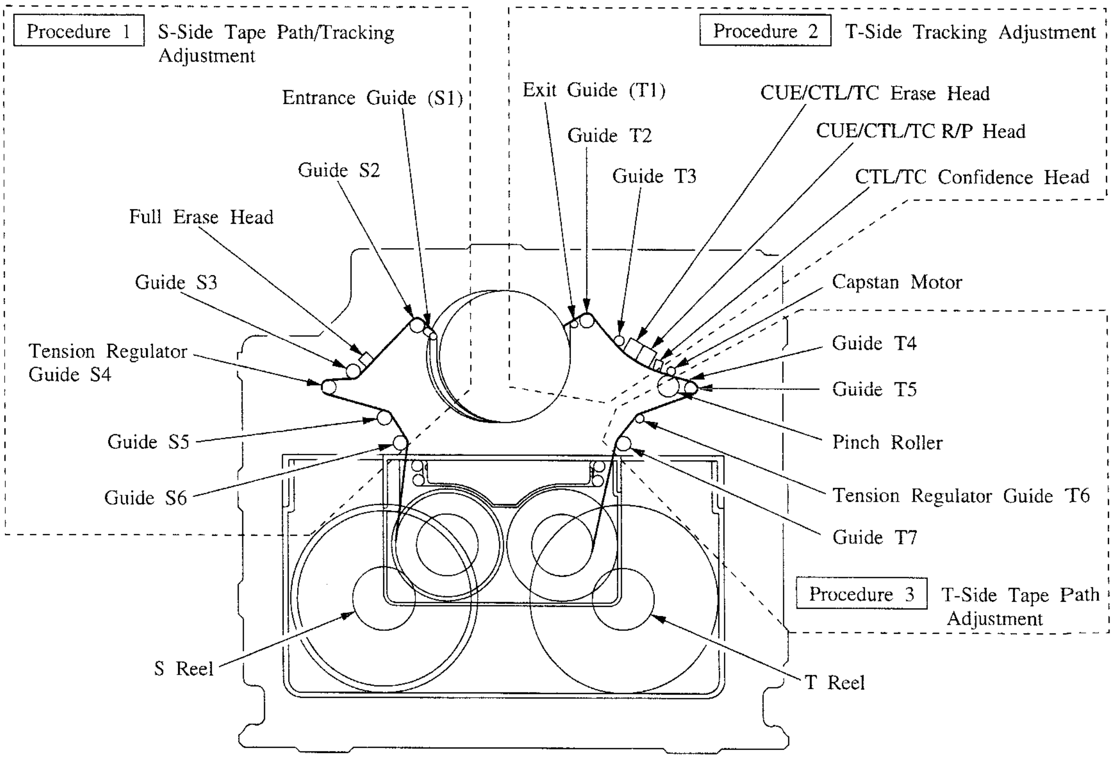
Fig. 9-15. Tape Path Adjustment

9-1. OUTLINE

This section describes how to adjust the tape path system of the DVR-20/20P/28/28P.
Tape path adjustment consists of following three procedures. Each procedure can be identified by the block shown in Fig. 9-16.
Tape path alignment should be carried out in the order of Procedure 1, Procedure 2 and Procedure 3.

Procedure 1: S-side Tape Path/Tracking Adjustment
Procedure 2: T-side Tracking Adjustment
Procedure 3: T-side Tape Path Adjustment

- Appendixes are attached at the end of this section.
  Especially, Appendix 1, Appendix 2 and Appendix 3 are the quick references for the tape path alignment.
  Appendix 1.Flowchart for Tape Path Alignment
  Appendix 2.Tape Path Check Quick Reference
  Appendix 3.S1/S2/T1/T2 Guide Adjustment Quick Reference
  Appendix 4.Quick Check for Tracking
  Appendix 5.How to Use Cleaning Cassette
    1: Head clogging check
    2: Channel condition check
    3: Envelope waveform check
  Appendix 6. S and T Reel Tables Height Adjustment
  Appendix 7. Monitor Select Keys Operation

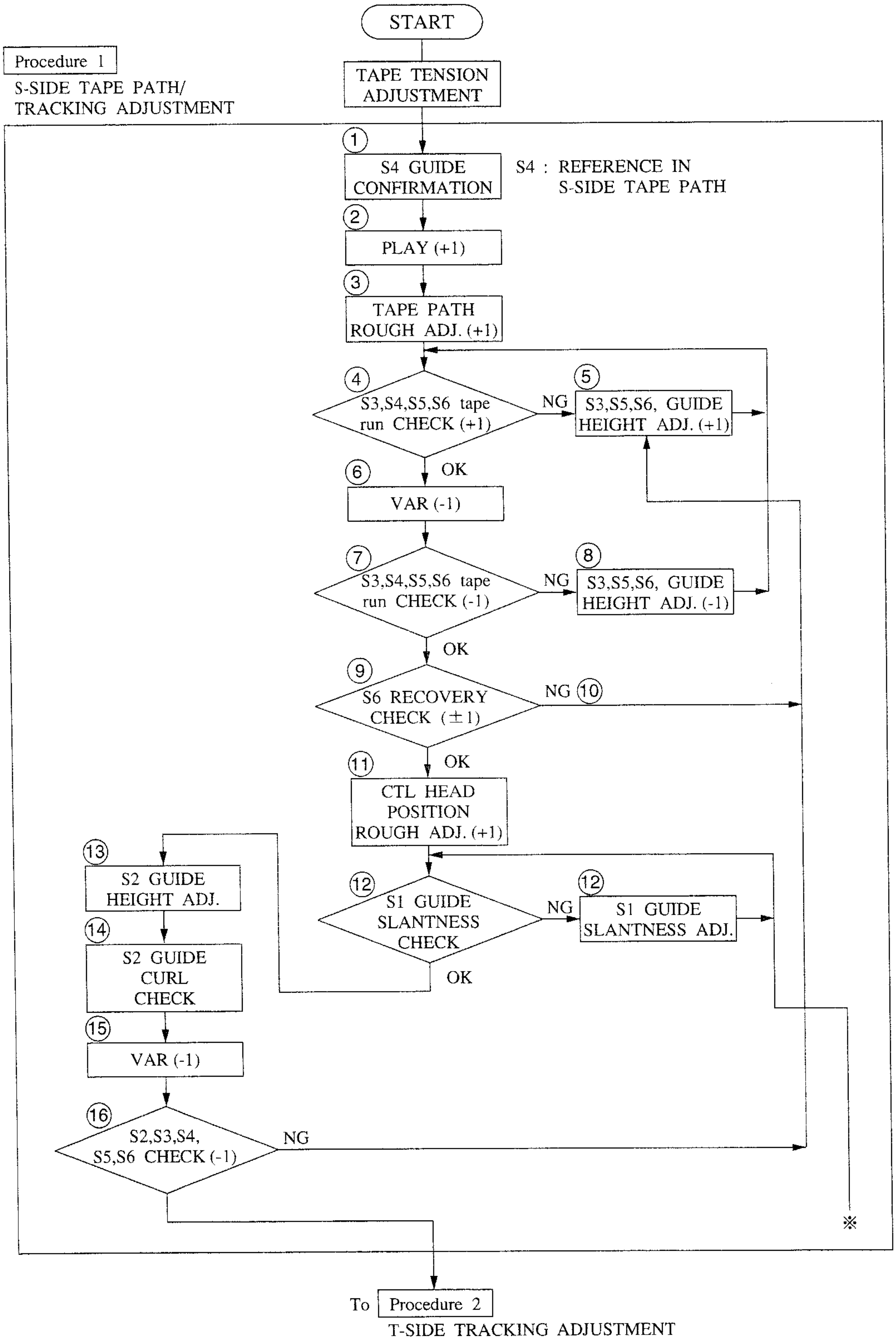

Procedure 1
S-Side Tape Path/Tracking Adjustment
Entrance Guide (S1)
Guide S2
Full Erase Head
Guide S3
Tension Regulator Guide S4
Guide S5
Guide S6
S Reel
Procedure 2
T-Side Tracking Adjustment
Exit Guide (T1)
Guide T2
Guide T3
CUE/CTL/TC Erase Head
CUE/CTL/TC R/P Head
CTL/TC Confidence Head
Capstan Motor
Guide T4
Guide T5
Pinch Roller
Tension Regulator Guide T6
Guide T7
Procedure 3
T-Side Tape Path Adjustment
T Reel

* The illustration is DVR-28/28P. For DVR-20/C20/20P, refer to Fig. 9-15.

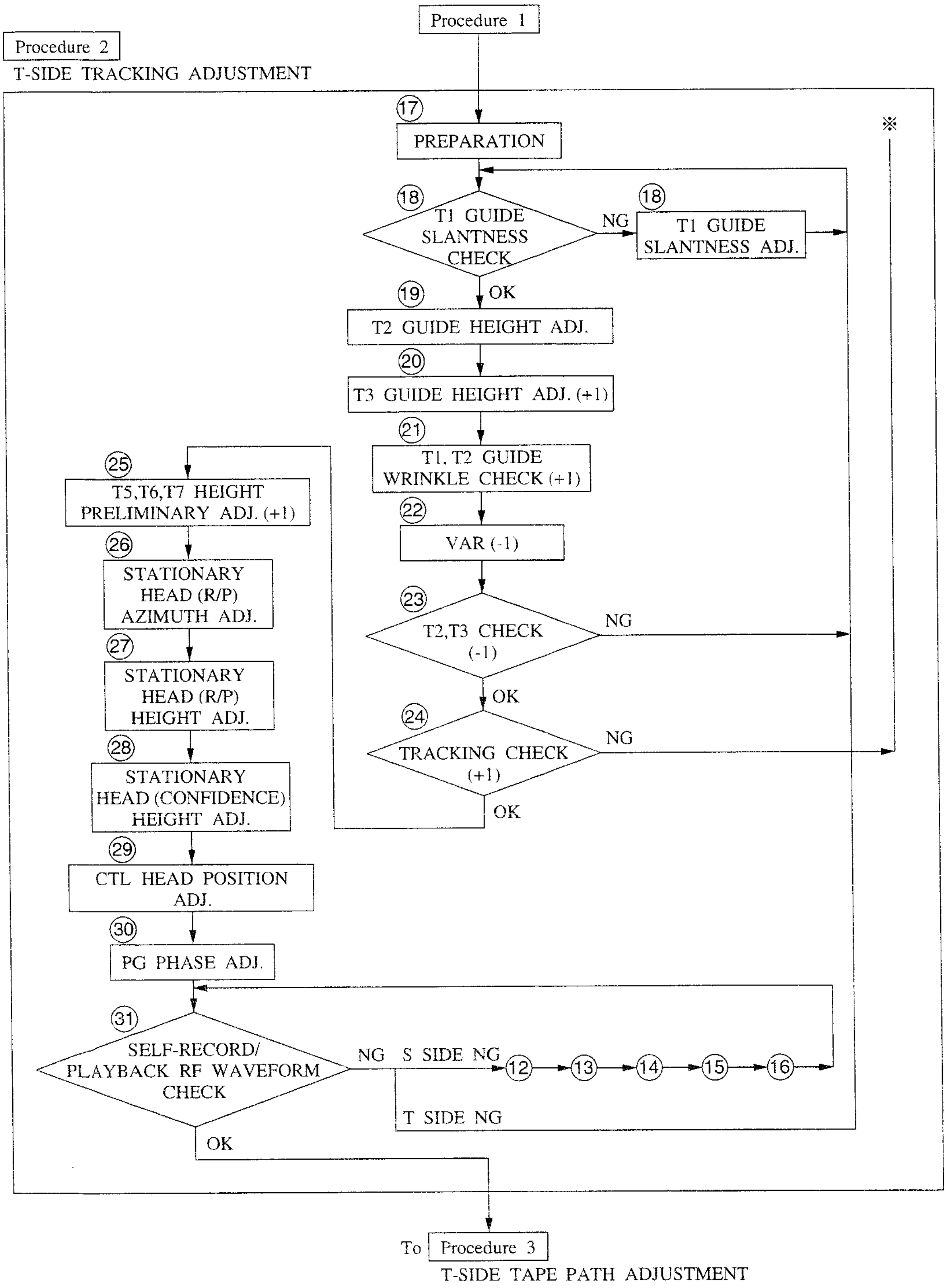
Fig. 9-16. Tape Path Alignment

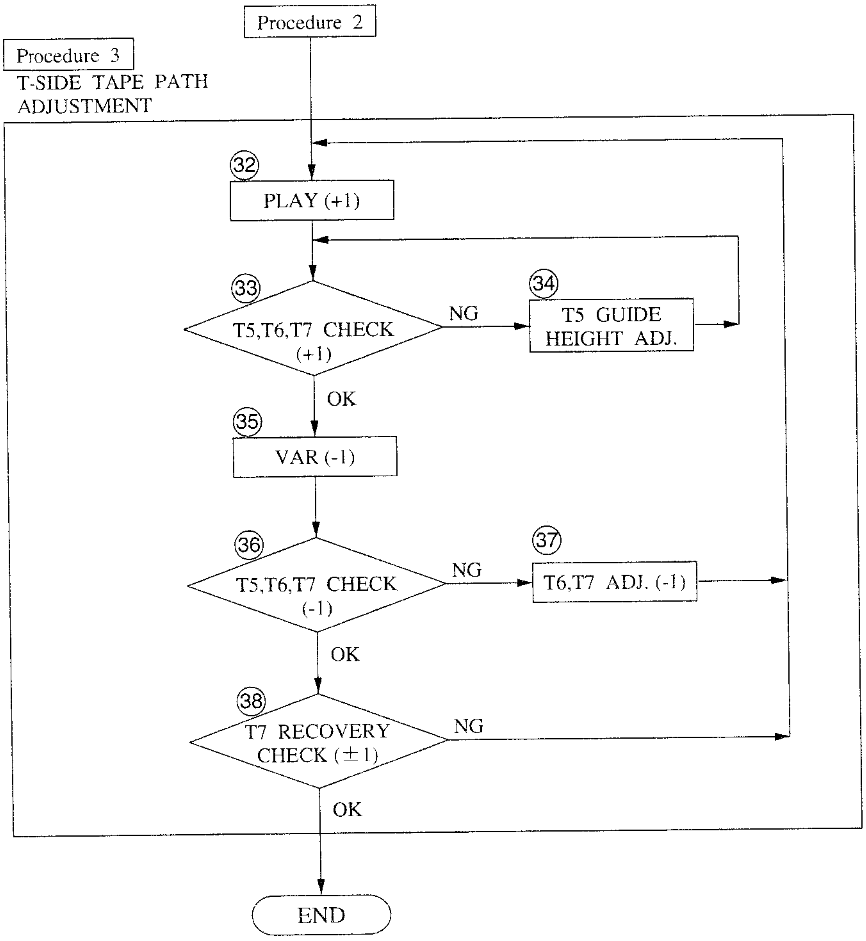
9-2. FLOWCHART FOR TAPE PATH SYSTEM Alignment (DETAILED DESCRIPTION)

Note: Numbers inside flowchart correspond to each adjustment procedure.


START
TAPE TENSION ADJUSTMENT
Procedure 1
S-SIDE TAPE PATH/ TRACKING ADJUSTMENT
①
S4 GUIDE CONFIRMATION
S4 : REFERENCE IN S-SIDE TAPE PATH
②
PLAY (+1)
③
TAPE PATH ROUGH ADJ. (+1)
④
S3,S4,S5,S6 tape run CHECK (+1)
NG
⑤
S3,S5,S6, GUIDE HEIGHT ADJ. (+1)
OK
⑥
VAR (-1)
⑦
S3,S4,S5,S6 tape run CHECK (-1)
NG
⑧
S3,S5,S6, GUIDE HEIGHT ADJ. (-1)
OK
⑨
S6 RECOVERY CHECK (±1)
NG ⑩
OK
⑪
CTL HEAD POSITION ROUGH ADJ. (+1)
⑫
S1 GUIDE SLANTNESS CHECK
NG
⑫
S1 GUIDE SLANTNESS ADJ.
OK
⑬
S2 GUIDE HEIGHT ADJ.
⑭
S2 GUIDE CURL CHECK
⑮
VAR (-1)
⑯
S2,S3,S4, S5,S6 CHECK (-1)
NG
※
To
Procedure 2
T-SIDE TRACKING ADJUSTMENT

Procedure 2
T-SIDE TRACKING ADJUSTMENT


Procedure 1
⑰ PREPARATION
※
⑱ T1 GUIDE SLANTNESS CHECK
NG
⑱ T1 GUIDE SLANTNESS ADJ.
OK
⑲ T2 GUIDE HEIGHT ADJ.
⑳ T3 GUIDE HEIGHT ADJ. (+1)
㉑ T1, T2 GUIDE WRINKLE CHECK (+1)
㉒ VAR (-1)
㉓ T2,T3 CHECK (-1)
NG
OK
㉔ TRACKING CHECK (+1)
NG
OK
㉕ T5,T6,T7 HEIGHT PRELIMINARY ADJ. (+1)
㉖ STATIONARY HEAD (R/P) AZIMUTH ADJ.
㉗ STATIONARY HEAD (R/P) HEIGHT ADJ.
㉘ STATIONARY HEAD (CONFIDENCE) HEIGHT ADJ.
㉙ CTL HEAD POSITION ADJ.
㉚ PG PHASE ADJ.
㉛ SELF-RECORD/ PLAYBACK RF WAVEFORM CHECK
NG
S SIDE NG
⑫ ⑬ ⑭ ⑮ ⑯
T SIDE NG
OK
To Procedure 3
T-SIDE TAPE PATH ADJUSTMENT


Procedure 2
Procedure 3
T-SIDE TAPE PATH ADJUSTMENT
㉜
PLAY (+1)
㉝
T5,T6,T7 CHECK (+1)
NG
㉞
T5 GUIDE HEIGHT ADJ.
OK
㉟
VAR (-1)
㊱
T5,T6,T7 CHECK (-1)
NG
㊲
T6,T7 ADJ. (-1)
OK
㊳
T7 RECOVERY CHECK (±1)
NG
OK
END

9-3. TAPE PATH ADJUSTMENT/TRACKING ADJUSTMENT

9-3-1. PRELIMINARY INFORMATION

A. Each guide is lowered by turning the flange clockwise, and is raised by turning the flange counterclockwise. When turning the flange by one turn (360°), height changes by 0.5mm.

B. After the completion of each guide height adjustment, be sure to tighten the setscrews. Tightening torque is 34.3×10^{-2} N·m (3.5 kgf·cm) for S4 and 58.8×10^{-2} N·m (6 kgf·cm) for others. After tightening the setscrews, check the position of guide. If changed, perform readjustment.

C. After the completion of all adjustment, apply a coat of screwlock to the following screws:

(Setscrew of each guide, S1/T1 slant adjustment screw, fixed (R/P) head height adjustment screw, CTL head position fixed screw, fixed R/P head azimuth adjustment screw and CONFIDENCE head height adjustment screw)

D. Letters (+1), (-1) or (±1) at the side of the title shows to perform in PLAY (+1), VAR (-1) or PLAY (+1)/VAR (-1).

E. In case the drum assembly has been replaced, be sure to put the unit into the REC mode for about 20 minutes using a commercially available tape, before performing the tracking check.

F. If the guide adjustment is made, do not curl the tape around the guide and then release it slowly.
In the DVR-20/20P/28/28P, its structure is designed so that tape curls are not easily made. If this adjustment method is used, the tape edge is excessively held by the flange. As a result, it might cause damage to the tape edge.

9-3-2. PROCEDURE 1
S-Side, Tape Path/Tracking Adjustment

Preliminary Information

1. Wrinkles and curls around the S4, S5, and S6 guides must be removed by adjusting the S5 guide. (Since the S4 guide is a reference guide, this guide should not be adjusted,) Since curls hardly occur around the S6 guide, avoid adjusting this guide as much as possible. Only in cases when wrinkles and curls cannot be removed by using the S5 guide should the S6 guide be adjusted.
In this case, however, the S6 guide must not be adjusted by more than ±90° after the adjustment is made accurately using a tool.
2. Refer to Fig. 9-17 for each guide height adjustment.

① S4 Guide Height Adjustment

Do not adjust the S4 guide. The S4 guide is the reference guide for the guide height adjustment.
When S4 guide is replaced or if height of S4 should be changed by mistake or there is a possibility to be changed the height of S4 guide, be sure to adjust the height of S4 guide using Maintenance Tool.
(Refer to "S4 Guide Height Adjustment" of Maintenance Manual Vol-1.)
If S-side tape path can not be adjusted by performing following procedures, check/adjustment again the height of S4 guide using Maintenance Tool.
Do not adjust the S4 guide after making these adjustments.

② Playback (+1)

Playback a commercially available tape of no damage along the edge.

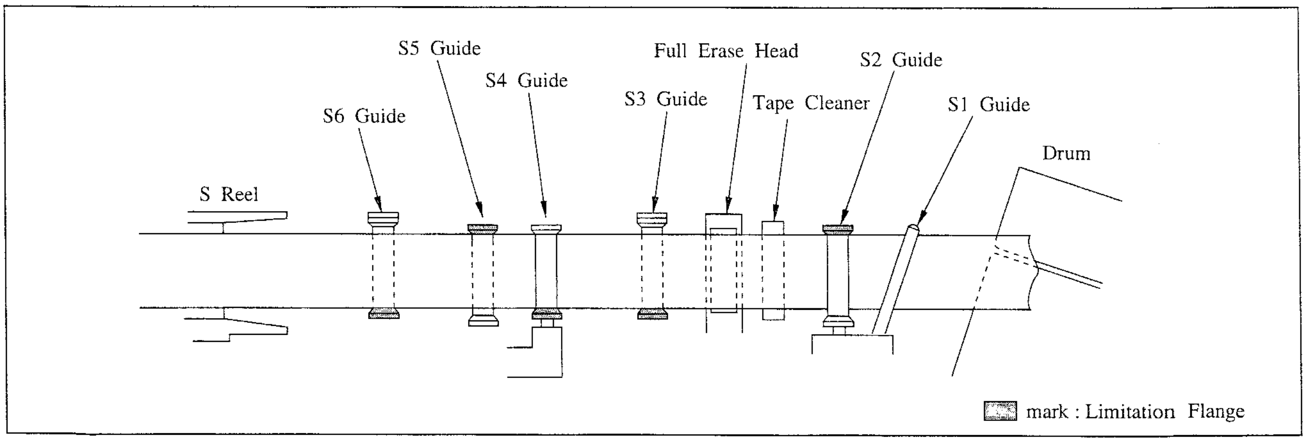


Fig. 9-17. S-side Tape Path System

③ Tape Path Rough Adjustment (+1)

Check the S side and T side tape guides. If any guide produces such a wrinkle or a curl that may damage a tape, make the wrinkle or the curl smaller by turning the flange of the guide which causes it in the sequence of S6 through S2 (excluding S4) and T2 through T7 (in the tape running direction).
(See Fig. 9-18 and Fig. 9-19.)

Do not adjust the S4 guide because it is reference guide. If there is remarkable curl or wrinkle around the S4 guide, minimize them by turning S5 and S6 guides.
In this case, however, the S6 guide must not be adjusted by more than ±90° after the adjustment is mode accurately using a tool.

Confirm that the tape does not touch with the both S and T reel flanges while running. When the tape touches with the reel flange, adjust the reel table height according to APPENDIX 6.

④ S3, S4, S5 and S6 Guides Tape Path Check (+1)

S3, S4 Guides

Check that there is no curl or wrinkle.

S5, S6 Guide

As shown in Fig. 9-20 (a), it is OK when a very small curl appears at the side of the flange without causing the tape damage. (However, perform adjustment to minimize the curl or wrinkle.)

As shown in Fig. 9-20 (b), it is NG when the tape is folded at the flange, in other words, tape runs over the flange.

Note: Since S6 guide uses a barrel-shaped type roller, a wrinkle around the middle of tape due to a barrel-shaped type is OK. However, the wrinkle caused by too much pressure upon tape edge with flange is NG and should be remedied.

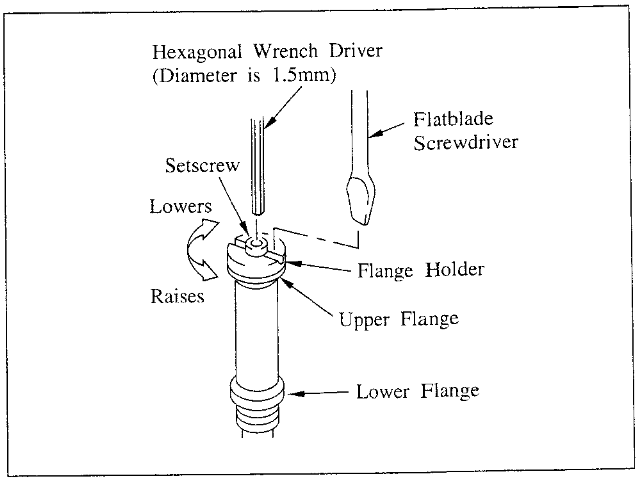

Hexagonal Wrench Driver
(Diameter is 1.5mm)
Flatblade
Screwdriver
Setscrew
Lowers
Raises
Flange Holder
Upper Flange
Lower Flange

Fig. 9-18. Guide Height Adjustment

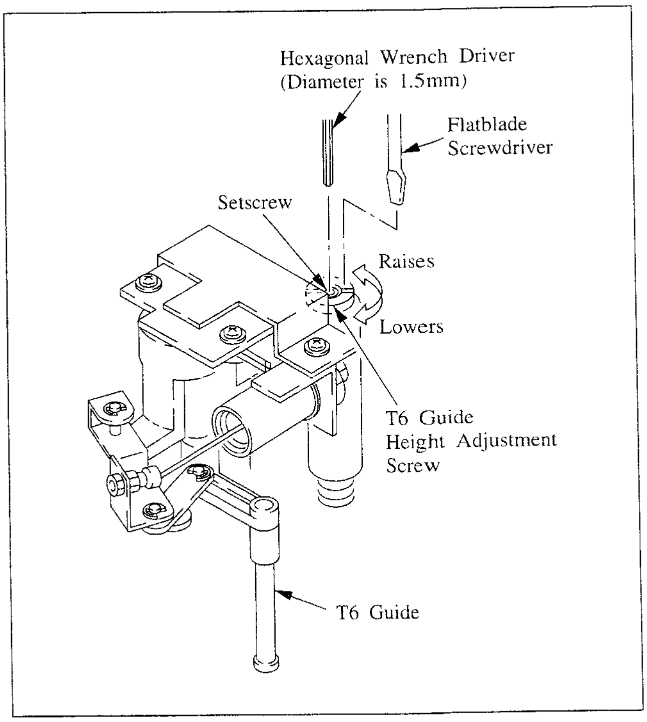

Hexagonal Wrench Driver
(Diameter is 1.5mm)
Flatblade
Screwdriver
Setscrew
Raises
Lowers
T6 Guide
Height Adjustment
Screw
T6 Guide

Fig. 9-19. T6 Guide Height Adjustment

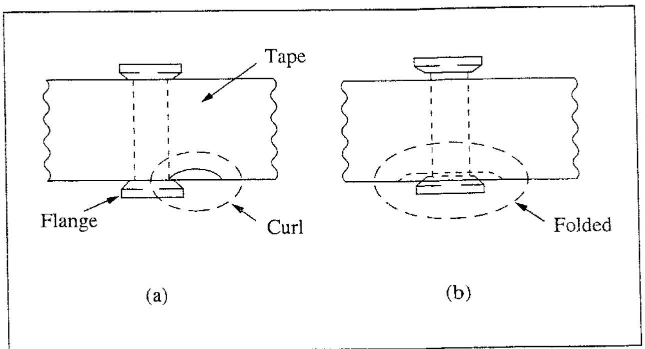

Tape
Flange
Curl
Folded
(a)
(b)

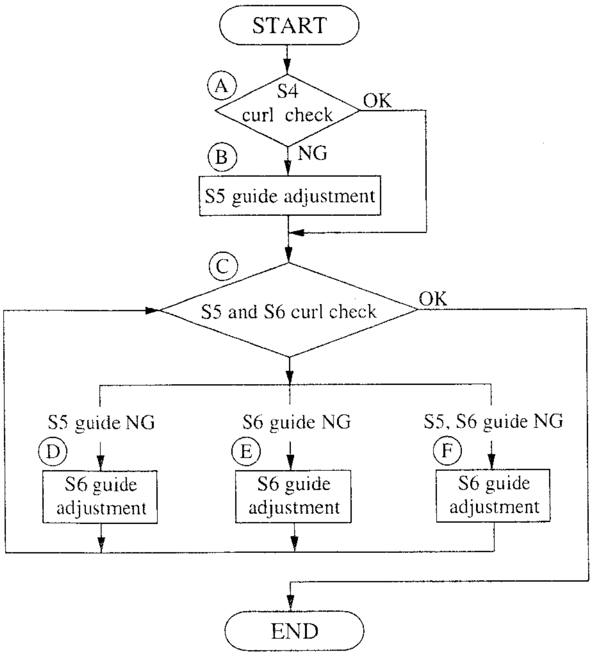
Fig. 9-20. Tape Curl Check

⑤ S3, S5 and S6 Guides Height Adjustment (+1)

1) Adjust the S5 and S6 guides according to the following flowchart.

Note 1 : Do not adjust S4 guide because it is reference guide.

Note 2 : If the S6 guide is adjusted, the S6 guide must not be adjusted by more than ±90° after the adjstment is made using a tool.


START
Ⓐ
S4 curl check
OK
Ⓑ
NG
S5 guide adjustment
Ⓒ
S5 and S6 curl check
OK
S5 guide NG
S6 guide NG
S5, S6 guide NG
Ⓓ
Ⓔ
Ⓕ
S6 guide adjustment
S6 guide adjustment
S6 guide adjustment
END

Ⓐ Check to see whether or not the S4 guide has curl. If there are no curls, execute step Ⓒ.

Ⓑ Move the S5 guide to remove the wrinkles and curls around the S4 guide. And adjust the limitation flange of the S4 and S5 guide as shown in Fig. 9-21.

Ⓒ Check to see whether or not the S5 and S6 guides have curls. If there are no curls, execute the steps after 2).

Ⓓ In this case, the S6 guide adjustment is made to remove curls around the S5 guide.

Ⓔ In this case, the S6 guide adjustment is made to remove curls around the S6 guide.

Ⓕ In this case, the S6 guide adjustment is made to remove curls around the S5 and S6 guides.

2) If the result is still NG after 4), dismount the S6 guide roller and mount it in the upside-down direction or replace it with a new roller and repeat 1).
3) Raise the S3 guide so that lower edge of tape is in contact with the lower flange.

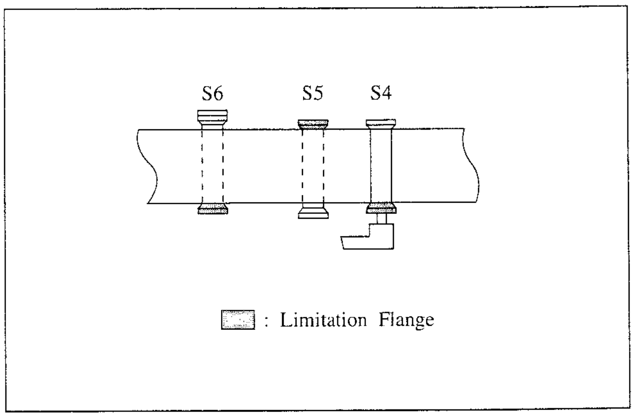

S6
S5
S4
▨ : Limitation Flange

Fig. 9-21. S4, S5 and S6 Limitation Flange

⑥ Set the equipment into VAR (-1) mode from PLAY (+1) mode

⑦ S3, S4, S5 and S6 Guides Tape Path Check (-1)

S3, S4, S5 and S6 Guides

As shown in Fig. 9-19 (a), it is OK when a very small curl appears at the side of the flange without causing the tape damage. However, perform adjustment to minimize the curl or wrinkle.

As shown in Fig. 9-19 (b), it is NG when the tape is folded at the flange, in other words, tape runs over the flange.

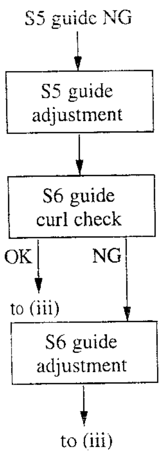
Note: Since S6 guide uses a barrel-shaped type roller, a wrinkle around the middle of tape due to a barrel-shaped type is OK. However, the wrinkle caused by too much pressure upon tape edge with flauge is NG and should be remedied.

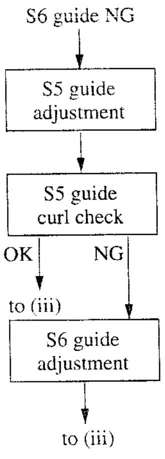
⑧ S3, S5 and S6 Guides Height Adjustment (-1)

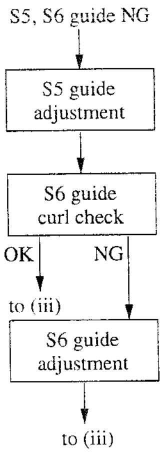
(i) If tape wrinkles or curls at S3 and S4, decrease the wrinkle or the curl by adjusting the S3 guide.
Do not adjust the S4 guide.

(ii) If the S5 or S6 guide has wrinkles or curls, adjust the S5 and S6 guides according to the following table.

Note: If the S6 guide is adjusted, it must not be adjusted by more than ±90° after the adjustment is made using a tool.


S5 guide NG
S5 guide adjustment
S6 guide curl check
OK
NG
to (iii)
S6 guide adjustment
to (iii)


S6 guide NG
S5 guide adjustment
S5 guide curl check
OK
NG
to (iii)
S6 guide adjustment
to (iii)


S5, S6 guide NG
S5 guide adjustment
S6 guide curl check
OK
NG
to (iii)
S6 guide adjustment
to (iii)

(iii) After making an adjustment, take the step ④ procedure for checking.

⑨ S6 Guide Recovery Check (+-1)

Note: Be sure to perform recovery check in both PLAY (+1) and VAR (-1) modes.

Push the upper portion and bottom portion of the S6 guide roller from the opposite side of the tape contacting side with bamboo stick as shown in Fig. 9-22 and fold the tape, in other words, runs the tape over the flange. In this case, the tape is folded at the lower flange. Then check that the tape is recovered form folding in 1 or 2 seconds after releasing bamboo stick.

When pushing the upper potion (a), tape is folded at the lower flange. In a same manner, check when pushing lower portion (b) of the S6 guide roller. In this case tape is folded at the upper flange.

S5 and S6 guides height adjustment is completed when recovery check shows OK. Perform step ⑪ and the latter.

⑩ S5 and S6 Guides Height Adjustment (+1)

If the result of a recovery check is NG, repeat from the step ⑤.

However, pay attention to the following.

If the S6 guide roller was mounted in the upside-down direction in the step ⑤ (or ⑧), replace the S6 guide roller with a new roller.

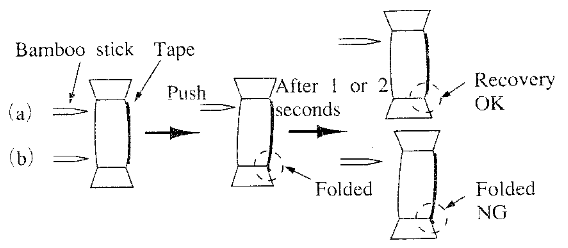

Bamboo stick
Tape
(a)
(b)
Push
After 1 or 2 seconds
Folded
Recovery OK
Folded NG

Fig. 9-22. Tape Recovery Check

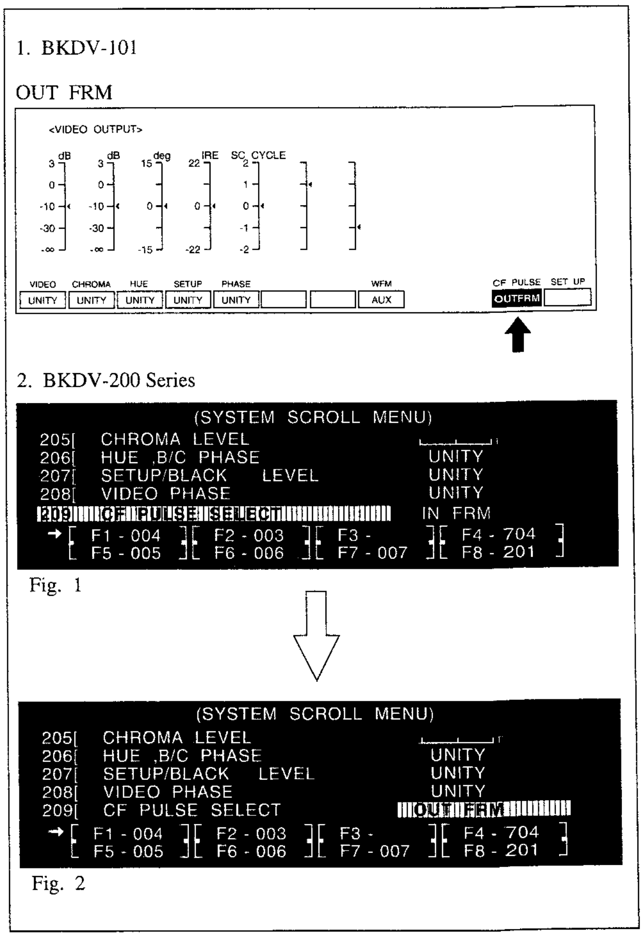
⑪ CTL Head Position Rough Adjustment (+1)

Playback an alignment tape ER2-2. If the CTL head position is greatly shifted, roughly adjust the CTL head position before-hand.

1) Connecting to Oscilloscope
   CH1 : TP101 (REC CH-A OUT) on REC-11 board
   CH2 : TP19 (CTL OUT) on AE board
   Trigger : CF PULSE OUT (BNC connector) on the control panel

2) Press the keys on the control panel in the following sequence to change the setting of CF PULSE to " OUT FRM".
   BKDV-101 : Press the VIDEO OUT key. Then, press the F11 key to select "OUT FRM". (Fig. 9-23.1)
   BKDV-200 series :
   Press the SHIFT + SET UP key.
   Select 209. [CF PULSE SELECT] by turning the search dial. Press the > key to move the cursor to the right. Press the ∧ key to select "OUT FRM". (Fig. 9-23.2)

3) Insert the alignment tape (ER2-2), and playback the TC 15 to 20 min portion.



1. BKDV-101

OUT FRM

<VIDEO OUTPUT>
dB
dB
deg
IRE
SC CYCLE
3
0
-10
-30
-∞
3
0
-10
-30
-∞
15
0
-15
22
0
-22
2
1
0
-1
-2
VIDEO
CHROMA
HUE
SETUP
PHASE
WFM
CF PULSE
SET UP
UNITY
UNITY
UNITY
UNITY
UNITY
AUX
OUTFRM

2. BKDV-200 Series

```
(SYSTEM SCROLL MENU)
205[ CHROMA LEVEL
206[ HUE .B/C PHASE             UNITY
207[ SETUP/BLACK   LEVEL        UNITY
208[ VIDEO PHASE                UNITY
209[ CF PULSE SELECT            IN FRM
→[ F1 - 004 ][ F2 - 003 ][ F3 -       ][ F4 - 704 ]
 [ F5 - 005 ][ F6 - 006 ][ F7 - 007 ][ F8 - 201 ]
```

Fig. 1

```
(SYSTEM SCROLL MENU)
205[ CHROMA LEVEL
206[ HUE .B/C PHASE             UNITY
207[ SETUP/BLACK   LEVEL        UNITY
208[ VIDEO PHASE                UNITY
209[ CF PULSE SELECT            OUT FRM
→[ F1 - 004 ][ F2 - 003 ][ F3 -       ][ F4 - 704 ]
 [ F5 - 005 ][ F6 - 006 ][ F7 - 007 ][ F8 - 201 ]
```

Fig. 2

Fig. 9-23. Indication of Control Panel Display

4) Adjust the amplitude of the RF envelope center to the maximum by the following procedure.

BKDV-101: Press the keys on the control panel in the following sequence.

TEST, F5 (RF)

Then, press the F4 key to change the setting of TRACKING to "VAR". And turn the control knob (Fig. 9-24.1) on the control panel.
(Fig. 9-25)

BKDV-200 series:

Pull the control knob (Fig. 9-24.2) on the control panel. The characters of VARIABLE appear. Then, turn the control knob.
(Fig. 9-25)

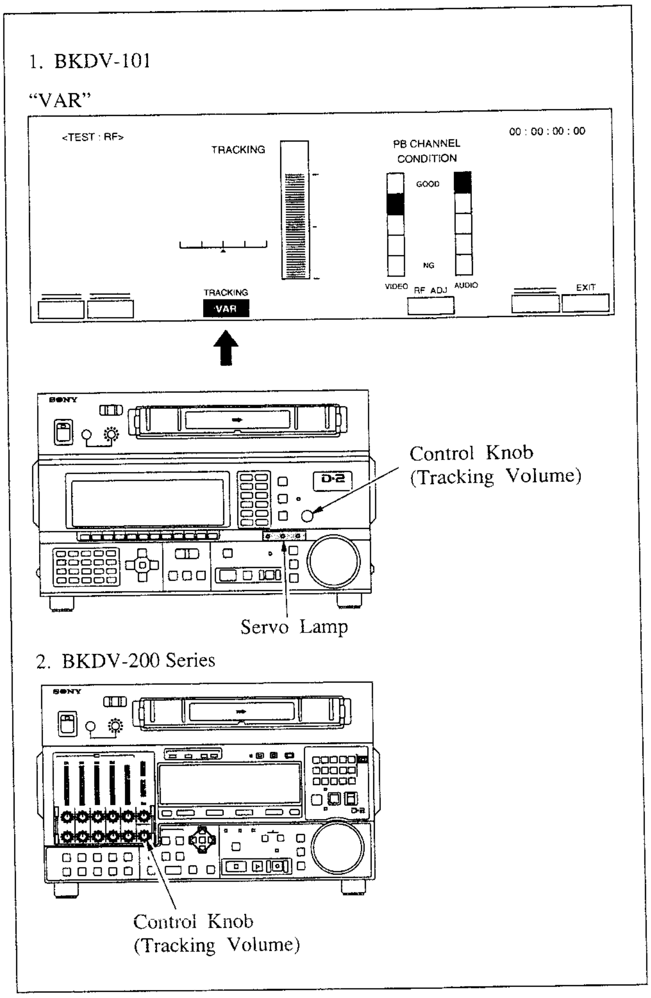

1. BKDV-101
“VAR”
<TEST : RF>
TRACKING
PB CHANNEL CONDITION
00 : 00 : 00 : 00
GOOD
NG
VIDEO
RF ADJ
AUDIO
EXIT
TRACKING
VAR
SONY
D-2
Control Knob (Tracking Volume)
Servo Lamp
2. BKDV-200 Series
SONY
Control Knob (Tracking Volume)

Fig. 9-24. Location of Control Knob

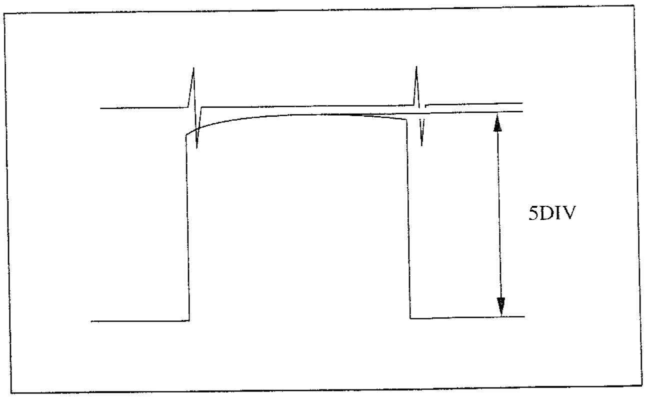


Fig. 9-25. RF Envelope and CTL Waveform

5) Then, change the setting of TRACKING to"FIX" by the following procedure and check to see if the amplitude of the RF envelope center does not greatly change.

   BKDV-101: Press the [F1] key on the control panel.
   BKDV-200 series: Push the tracking volume.

   If the RF waveform greatly changes, loosen the CTL head fixing screws (Fig. 9-26), insert screwdriver into the adjustment hole and move it in the direction shown by an arrow A until the amplitude of the center of RF envelope in "FIX" becomes maximum.

   For more details, refer to step ㉙ CTL Head Position Adjustment.

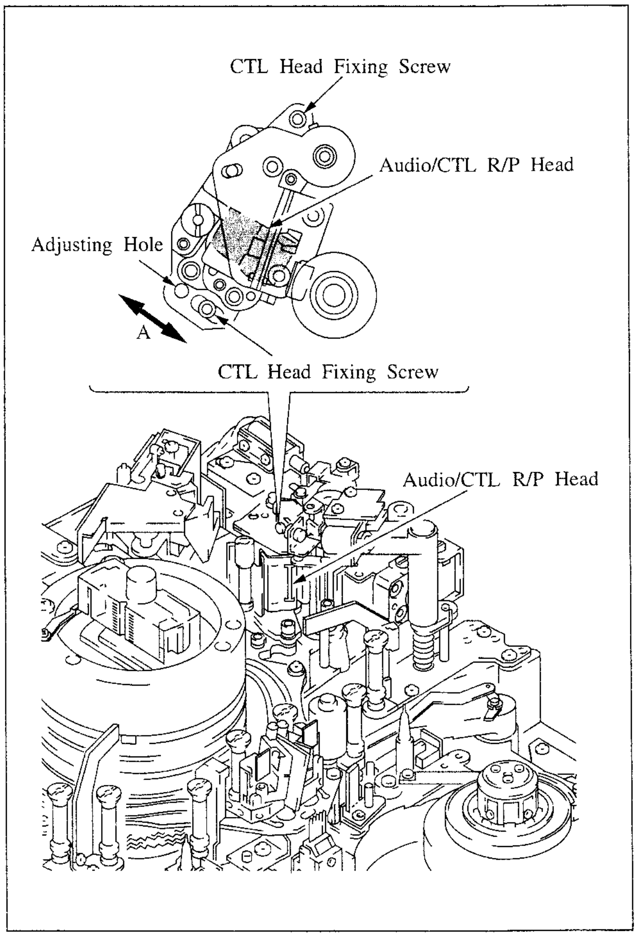


Fig. 9-26. CTL Head Position Rough Adjustment

6) Adjust this maximum RF envelope level to 5 divisions (100%) on the oscilloscope with VAR control of oscilloscope as shown in Fig. 9-25.

   Note: When CTL head position is changed by considerable amount, first perform step ㉚ PG Phase Adjustment, then proceed to the next step ⑫ . At this time, specification of the PG phase should be within 0±10 μsec.

⑫ S1 Guide Slantness Check and Adjustment

Preliminary Information

In case immediately after the upper drum assembly is replaced, be sure to put the unit into the REC mode for about 20 minutes using a commercially available tape, before starting this check.

Note: Check to see that the RF envelope is maximum and it is 5 division (100%) on the oscilloscope.

1) Playback ER2-2 (0 to 15min).
2) Raise the S2 guide from the position shown in Fig. 9-27 for the purpose to check the adjustable amount of the adjustment screws A and B in Fig. 9-27. (It is obtained by turning the S2 Height Adjusting Screws counter-clockwise shown in Fig. 9-27.)

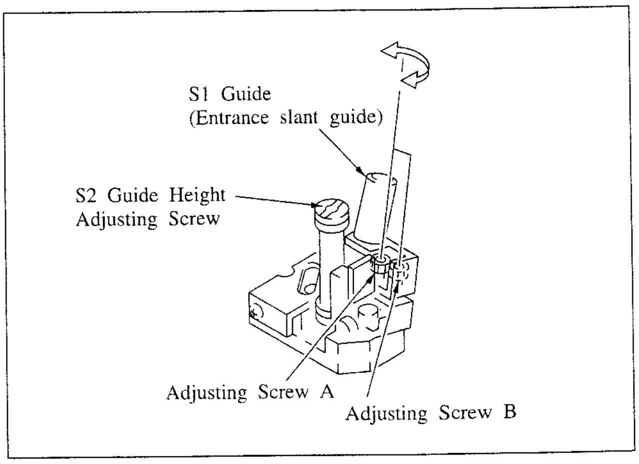


Fig. 9-27. Slant Guide Assembly

As the S2 guide is raised, the upper edge of the tape moves upward following the upper flange of S2 guide so that the RF envelope changes as shown in Fig. 9-27. However when the upper flange is raised higher than a certain point, the tape will no longer follows the upper flange and there will be no change in the RF envelope any more.

The amount of tape to move upward depends upon the slantness of the S1 guide. As the S1 guide is more slanted, lower portion is pressed more strongly against the guide, i. e., the tape tension is higher in the lower portion of the tape. As the tape tension in the lower portion is increased, the amount of tape to move upward becomes greater. (This method of adjustment to increase the tape tension in the lower half of tape with S1 guide is called "higher tension in lower half of tape method", and its amount is called "the amount of higher tension in lower half of tape".)

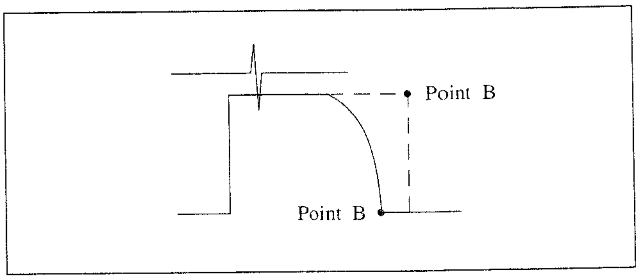


Fig. 9-28. RF Envelope

Note: If the S2 guide is further raised even higher than the point where RF envelope does not change any more, the S2 guide's bottom flange contacts the bottom edge of tape and starts pushing the tape upward that changes the RF envelope again. This change is not the desired result from the slant adjustment. This phenomenon should be avoided. Do not raise the S2 guide too high. If this phenomenon is difficult to recognize, observe a clearance between bottom edge of tape and lower flange of S2.

Change prosess of RF envelope is described as follows.

As an example, the S2 guide's height is first raised, and will reach the point where RF envelope will not change any more. Assuming that the point is shown in ⓓ in Fig. 9-29.

Observe the change of point-Ⓑ in ⓐ, ⓑ, ⓒ, ⓓ of Fig. 9-29. As the S2 guide's height is raised, the point- Ⓑ starts decreasing from the initial state of ⓐ to ⓑ , ⓒ and reaches 0% level in ⓓ finally.

The slant adjustment of the S1 guide affects in such a manner that the S1's slantness determines the point-B to be either ⓑ or ⓓ characteristics.

Required specification for the point-B position is shown below (Fig. 9-30). If the specification is not satisfied, adjust it using the adjustment procedure described in the following paragraph.

Specification:Point B must be within ▨ in the Fig. 9-30.

An example within the specification is shown in Fig. 9-31. Because point B fluctuates slightly, check that its center meets the specification.

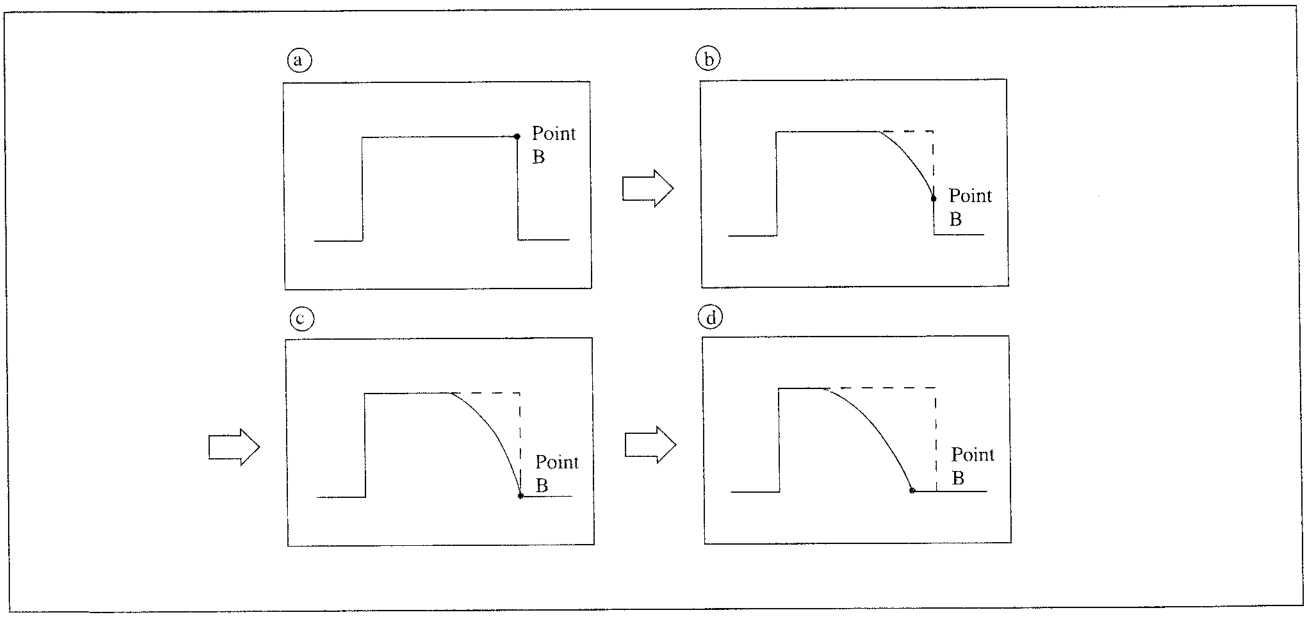


Fig. 9-29. Change process of RF Envelope

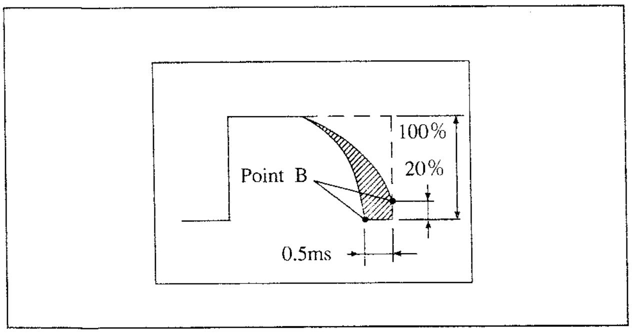


Fig. 9-30. Specification of S1 Guide Slantness Adjustment

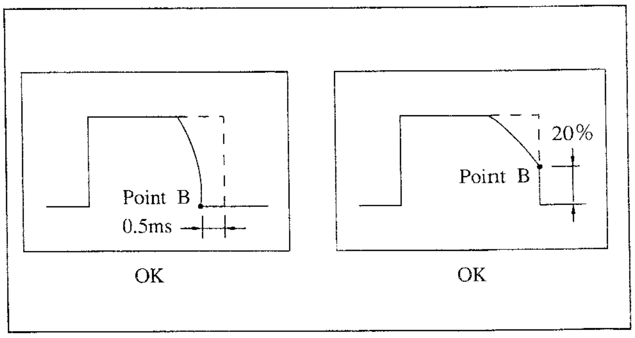


Fig. 9-31. OK

3) If point B does not satisfy the specification, adjust it as below:

(i) In case of ⓐ in Fig. 9-32.

This shows that the tape has too high tension at the lower part. Adjust to reduce the tension. Slightly loosen adjusting screw B in Fig. 9-27, and slightly tighten adjusting screw A. Then, tighten adjusting screw B, and adjusting screw A with a tightening torque of 29.4×10^{-2} N·m (3 kgf·cm) .

Lower the S2 guide again, returning it to the normal position. And then raise it to a point where the envelope no longer changes, and check that point B satisfies the specification.

In case of ⓐ in Fig. 9-32, too high tension at the lower part of tape can also be recognized by tape curl at the upper flange of the S2 guide that tend to occur in the tape as shown in Fig. 9-33.

(ii) In case of ⓑ in Fig. 9-32

This shows that the tape tension at lower part is too low. Adjust to increase the tension.

Slightly loosen adjusting screw A in Fig. 9-27, and slightly tighten adjusting screw B. Then, tighten adjusting screw A, and adjusting screw B with a tightening torque of 29.4×10^{-2} N·m (3 kgf·cm).

Lower the S2 guide again, returning, it to the normal position. And then raise it to a point where the RF envelope no longer changes. Check that point B satisfies the specification.

4) Unthread ER2-2 once and play it back again to make sure that the specification of 2) is satisfied. If the result is NG, repeat from 1).

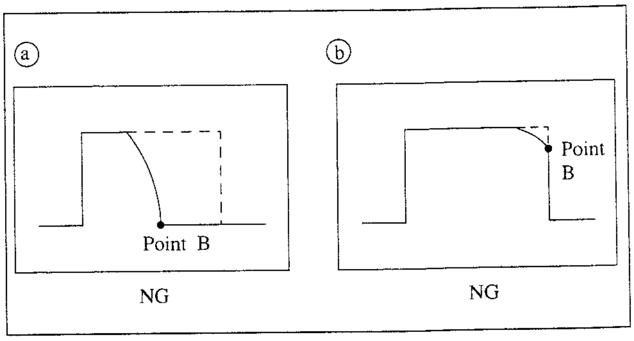


Fig. 9-32. NG

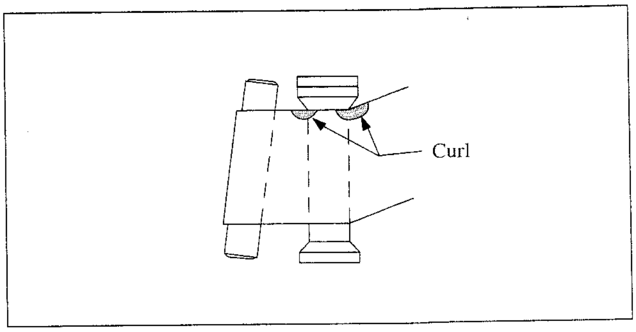


Fig. 9-33. Tape Path of S2 Guide

⑬ S2 Guide Height Check and Adjustment

After completion of S1 guide adjustment, adjust the height of the S2 guide.

1) Change the setting of TRACKING to "VAR".
   When the adjusting control (See Fig. 9-24) on the control panel is turned right and left, the portion (a) of Fig. 9-35 should change in parallel.
   If not, adjust S2 guide's height to change in parallel as possible. (See Fig. 9-34)
   But, portion (b) of Fig. 9-35 is determined depending upon the shape of rabbet guide of the drum. So, adjust S2 height to make portion (a) as parallel as possible.

   When portion (a) in Fig. 9-35 does not move parallel.
   - In case of (a) in Fig. 9-36.
     Lower the height of S2 guide because it is too high.
   - In case of (b) in Fig. 9-36.
     Raise the height of S2 guide because it is too low.

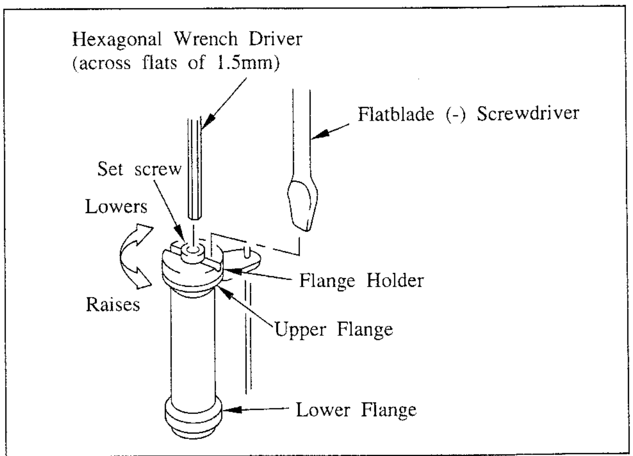
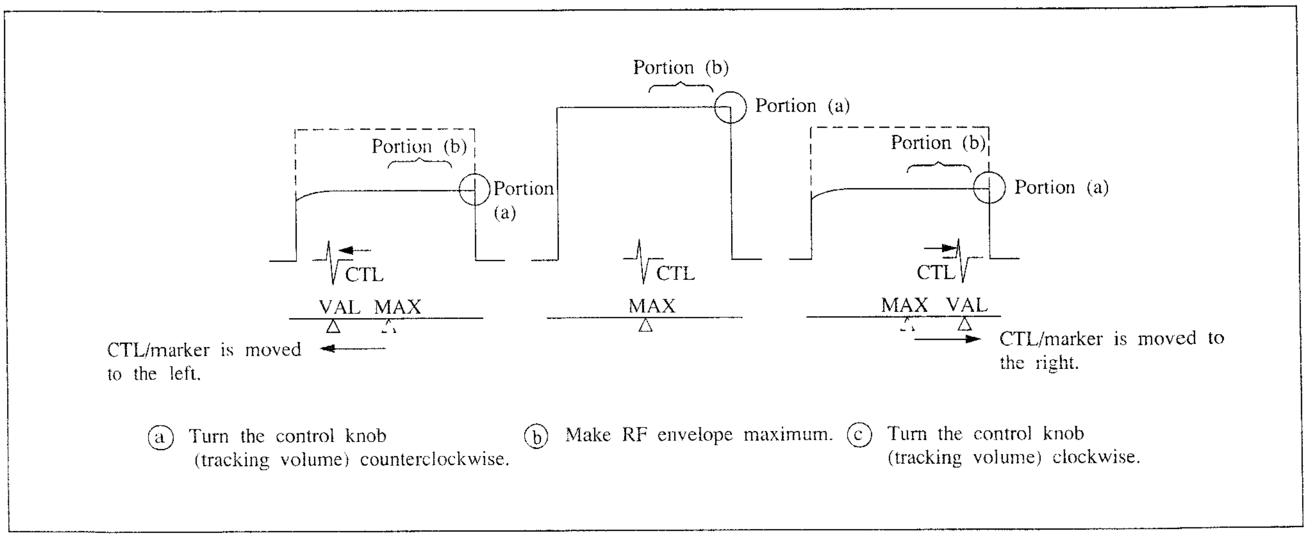
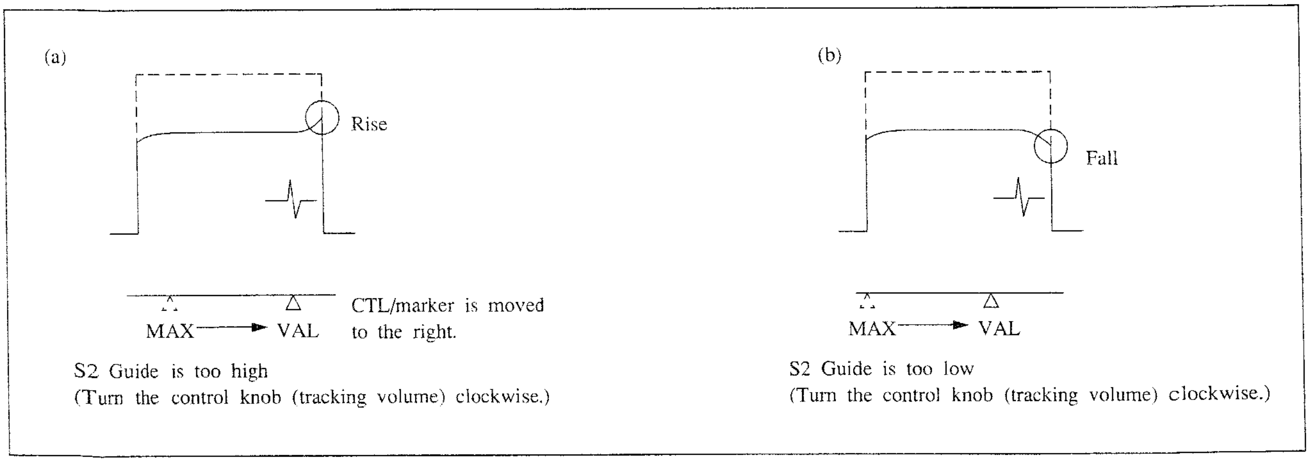

Hexagonal Wrench Driver
(across flats of 1.5mm)
Flatblade (-) Screwdriver
Set screw
Lowers
Raises
Flange Holder
Upper Flange
Lower Flange

Fig. 9-34. S2 Guide Height Adjustment


Portion (b)
Portion (a)
Portion (b)
Portion
(a)
Portion (b)
Portion (a)
CTL
CTL
CTL
VAL MAX
MAX
MAX VAL
CTL/marker is moved
to the left.
CTL/marker is moved to
the right.

ⓐ Turn the control knob (tracking volume) counterclockwise.
ⓑ Make RF envelope maximum.
ⓒ Turn the control knob (tracking volume) clockwise.

Fig. 9-35. S2 Guide Height Check


(a)
Rise
MAX VAL
CTL/marker is moved
to the right.
(b)
Fall
MAX VAL

S2 Guide is too high
(Turn the control knob (tracking volume) clockwise.)

S2 Guide is too low
(Turn the control knob (tracking volume) clockwise.)

Fig. 9-36. S2 Guide Height is NG.

2) After making this adjustment, tighten the set-screw shown in Fig. 9-34.

3) After tightening the set-screw, repeat 1) to make sure that the portion (a) in Fig. 9-35 moves in parallel. If the result is NG, repeat the adjustment from 1).

4) Unthread ER2-2 once and play it back again to make sure that the portion (a) in Fig. 9-35 moves in parallel. If the result is NG, repeat the adjustment from 1).

⑭ S2 Guide Curl Check

Check that there is no curl on the front and rear sides of the S2 guide as shown in Fig. 9-34.

⑮ Set the unit from PLAY (+1) mode into VAR (-1) mode

⑯ S2, S3, S4, S5 and S6 Guides Tape Run Check (-1)

S2, S3, S4, S5 and S6 Guides

As shown in Fig. 9-19 (a), A very small curl appearing at the side of the flange without causing the tape damage is OK. However, adjust so as to minimize the curl or wrinkle.
As shown in Fig. 9-19 (b), it is NG when the tape is folded on the flange, in other words, tape runs over the flange.

Note: Since S6 guide uses a barrel-shaped type roller, a wrinkle around the middle of tape due to a barrel-shaped type can be ignored. However, it is NG that a wrinkle caused by pressing the tape edge downward with the flange.

If the result is NG, repeat the adjustment from step ⑤.

9-3-3. PROCEDURE 2 T-Side Tracking Adjustment

⑰ Preparation for Adjustment

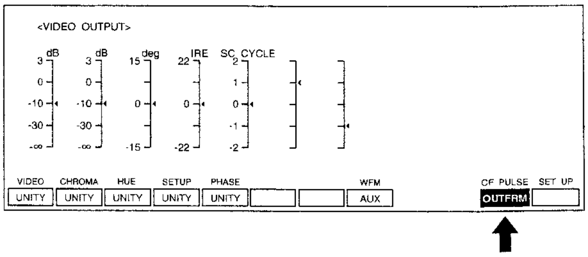
1) Connecting to Oscilloscope
   CH-1 : TP101 (REC CH-A OUT) on REC-11 board
   CH-2 : TP19 (CTL OUT) on AE board
   Trigger : CF PULSE OUT (BNC connector) on the control panel

2) Press the keys on the control panel in the following sequence to change the setting of CF PULSE to "OUT FRM".
   BKDV-101: Press the VIDEO OUT key. Then, press the F11 key to select "OUT FRM". (Fig. 9-37.1)
   BKDV-200 series:
   Press the SHIFT + SET UP key.
   Select 209. [CF PULSE SELECT] by turning the search dial.
   Press the > key to move the cursor to the right. Then, press the ∧ key to select "OUT FRM". (Fig. 9-37.2)

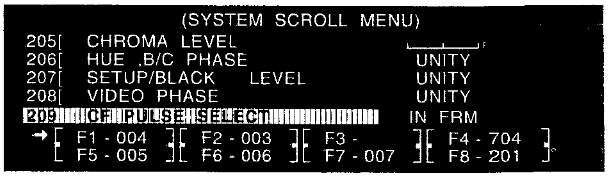
3) Insert the alignment tape (ER2-2) and playback the TC (0 to 15min) portion.

1. BKDV-101

OUT FRM

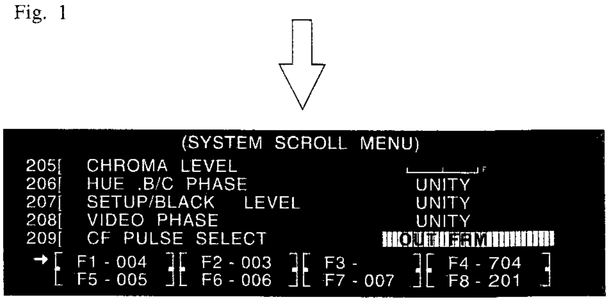

<VIDEO OUTPUT>
dB
dB
deg
IRE
SC CYCLE
3
0
-10
-30
-∞
15
-15
22
-22
2
1
-1
-2
VIDEO
CHROMA
HUE
SETUP
PHASE
WFM
CF PULSE
SET UP
UNITY
UNITY
UNITY
UNITY
UNITY
AUX
OUTFRM

2. BKDV-200 Series



```
(SYSTEM SCROLL MENU)
205[  CHROMA LEVEL
206[  HUE .B/C PHASE                 UNITY
207[  SETUP/BLACK   LEVEL            UNITY
208[  VIDEO PHASE                    UNITY
209[  CF PULSE SELECT               IN FRM
 →[  F1 - 004  ][  F2 - 003  ][  F3 -      ][  F4 - 704  ]
  [  F5 - 005  ][  F6 - 006  ][  F7 - 007  ][  F8 - 201  ]
```

Fig. 1



```
(SYSTEM SCROLL MENU)
205[  CHROMA LEVEL
206[  HUE .B/C PHASE                 UNITY
207[  SETUP/BLACK   LEVEL            UNITY
208[  VIDEO PHASE                    UNITY
209[  CF PULSE SELECT               OUT FRM
 →[  F1 - 004  ][  F2 - 003  ][  F3 -      ][  F4 - 704  ]
  [  F5 - 005  ][  F6 - 006  ][  F7 - 007  ][  F8 - 201  ]
```

Fig. 2

Fig. 9-37. EL Panel Display

4) Adjust center of the RF envelope amplitude to the maximum by the following procedure.

BKDV-101: Press keys on the control panel in the following sequence.

TEST, F5 (RF)

Then, press the F4 key to change the setting of TRACKING to "VAR".(Fig. 9-37.1). Turn the control knob on the control panel for maximum amplitude. (Fig. 9-38.1)

BKDV-200 series:

Pull the control knob (Fig. 9-37-2) on the control panel. The indication of VARIABLE appears. Then, turn the control knob for adjustment.

5) Set the maximum RF envelope level to 5 divisions (100%) on the oscilloscope as shown in Fig. 9-39.

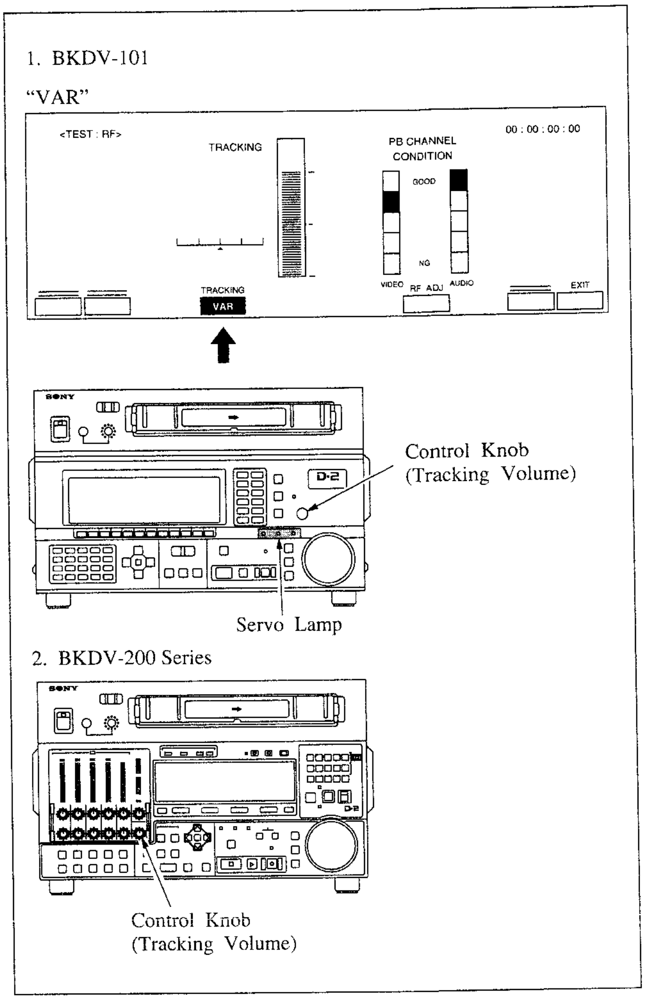

1. BKDV-101
"VAR"
<TEST : RF>
TRACKING
PB CHANNEL CONDITION
00 : 00 : 00 : 00
GOOD
NG
VIDEO
RF ADJ
AUDIO
TRACKING
VAR
EXIT
SONY
D-2
Control Knob (Tracking Volume)
Servo Lamp
2. BKDV-200 Series
SONY
D-2
Control Knob (Tracking Volume)

Fig. 9-38. Location of Control Knob

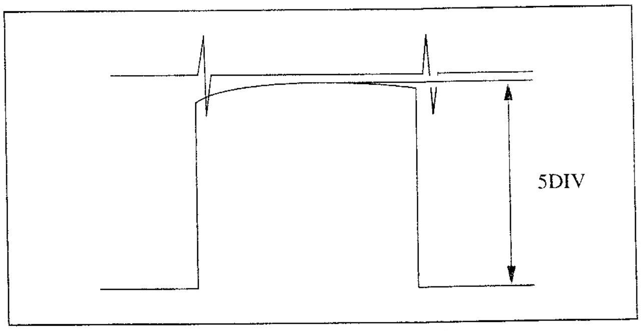


Fig. 9-39. RF Envelope and CTL Waveform

⑱ T1 Guide Slantness Check and Adjustment

1) (T2 guide height tentative adjustment)
Set TRACKING to "VAR". Check to see if the portion (a) in Fig. 9-41 moves in parallel when the control knob (Fig. 9-41) on the control panel is turned to left and right. If it does not move in parallel, turn the set screw shown in Fig. 9-40 according to the following instruction until the portion (a) moves in parallel.

2) (T3 guide height tentative adjustment)
Loosen the set screw of the T3 guide shown in Fig. 9-42 and make tape curl at the lower flange by pressing the flange retainer. Turn the flange retainer in the clockwise direction to lower the T3 guide. When the curl disappears, tighten the set screw.

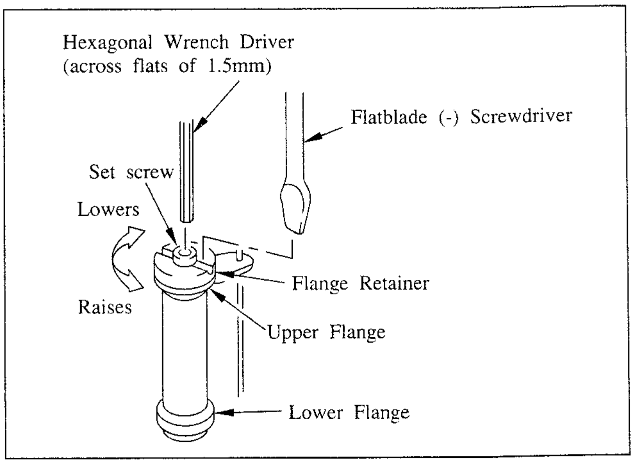

Hexagonal Wrench Driver
(across flats of 1.5mm)
Flatblade (-) Screwdriver
Set screw
Lowers
Raises
Flange Retainer
Upper Flange
Lower Flange

Fig. 9-40. T2 Guide Height Tentative Adjustment

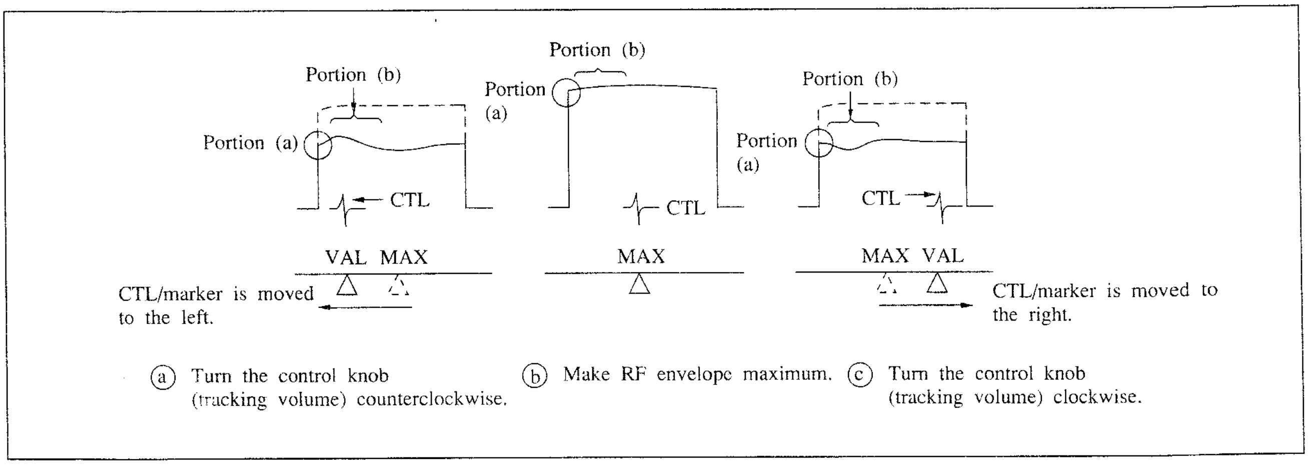

Portion (b)
Portion (a)
CTL
VAL MAX
CTL/marker is moved to the left.
Portion (b)
Portion (a)
CTL
MAX
Portion (b)
Portion (a)
CTL
MAX VAL
CTL/marker is moved to the right.
ⓐ Turn the control knob (tracking volume) counterclockwise.
ⓑ Make RF envelope maximum.
ⓒ Turn the control knob (tracking volume) clockwise.

Fig. 9-41. T2 Guide Height Tentative Check

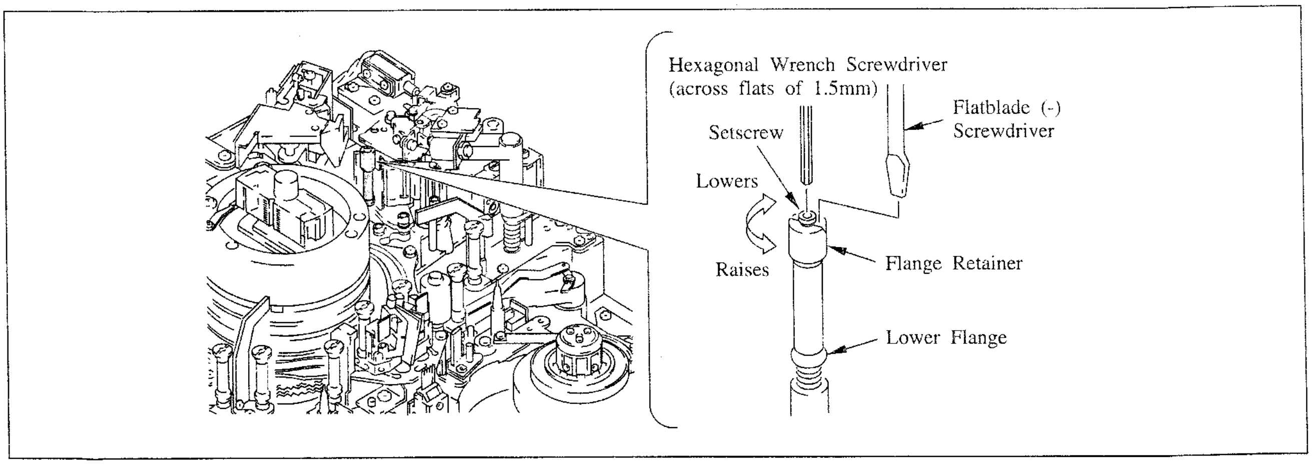

Hexagonal Wrench Screwdriver
(across flats of 1.5mm)
Flatblade (-) Screwdriver
Setscrew
Lowers
Raises
Flange Retainer
Lower Flange

Fig. 9-42. T3 Guide Height Tentative Check

3) Raise the T2 guide from the position shown in Fig. 9-39 in order to check the adjustable amount of the adjusting screws A and B. (It is obtained by turning the Height Adjusting Screws counterclockwise shown in Fig. 9-43.)

The tape follows the upper flange so that the RF envelope changes as shown in Fig. 9-44. However when the upper flange is raised to a certain point, the tape no longer follows the upper flange and there will be no change in the RF envelope.

The amount of tape to move upward depends upon the slantness of the S1 guide. As the S1 guide is more slanted, lower portion is pressed more strongly against the guide, i. e., the tape tension is higher in the lower portion of the tape. As the tape tension in the lower portion is increased, the amount of tape to move upward becomes greater. (This method of adjustment to increase the tape tension in the lower half of tape with S1 guide is called "higher tension in lower half of tape method", and its amount is called "the amount of higher tension in lower half of tape".)

Note: If the S2 guide is further raised even higher than the point where RF envelope does not change any more, the S2 guide's bottom flange contacts the bottom edge of tape and starts pushing the tape upward that changes the RF envelope again. This change is not the desired result from the slant adjustment. This phenomenon should be avoided. Do not raise the S2 guide too high. If this phenomenon is difficult to recognize, observe a clearance between bottom edge of tape and lower flange of S2.

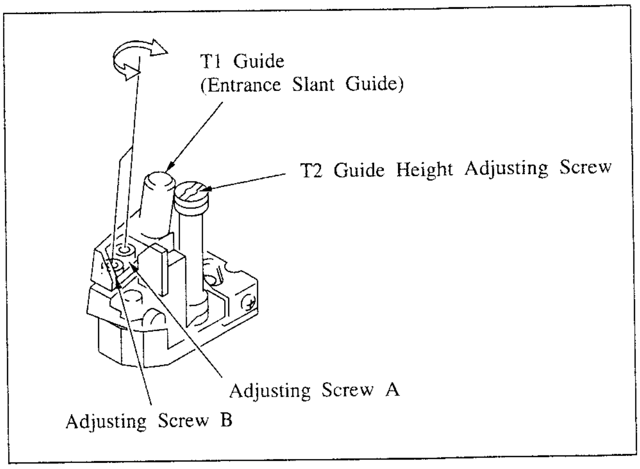

T1 Guide
(Entrance Slant Guide)
T2 Guide Height Adjusting Screw
Adjusting Screw A
Adjusting Screw B

Fig. 9-43. Slant Guide Assembly

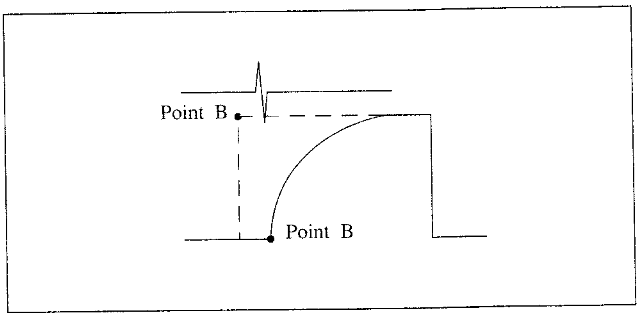

Point B
Point B

Fig. 9-44. RF Envelope

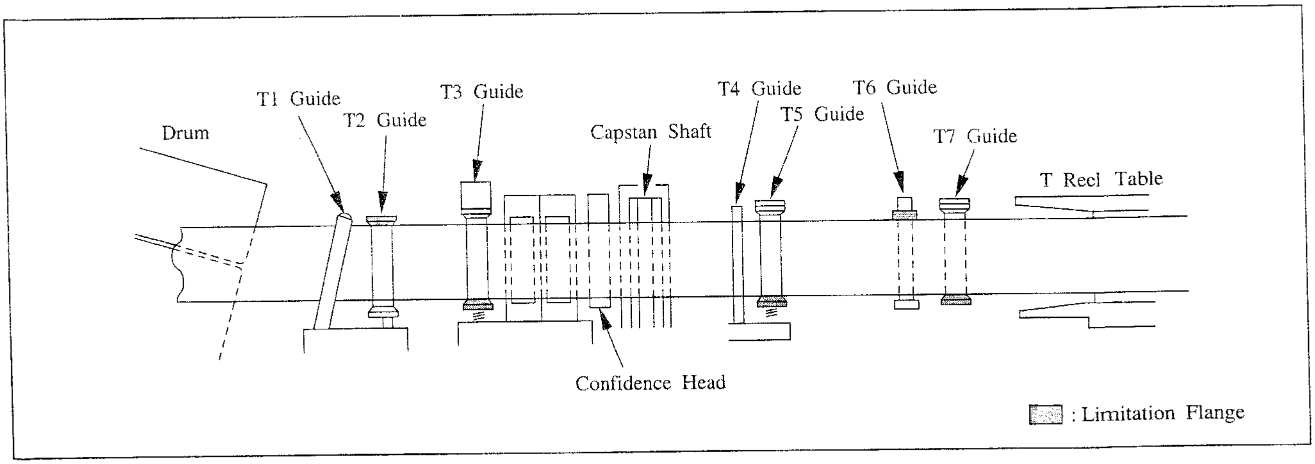

Drum
T1 Guide
T2 Guide
T3 Guide
Capstan Shaft
T4 Guide
T5 Guide
T6 Guide
T7 Guide
T Reel Table
Confidence Head
▨ : Limitation Flange

Fig. 9-45. T-side Tape Path System

The specification of the point B is as follows.

Note : This specification must be checked under the following condition. The T3 guide generates neither a wrinkle, nor a curl when the T2 guide is set to the height that produces the maximum RE envelope at T side.

Specification : The point B must be in the shaded ▨ part of Fig. 9-46.
Because the point B has some fluctuation, make sure that its center meets the specification. Fig. 9-47 shows an example in which the specification is satisfied.

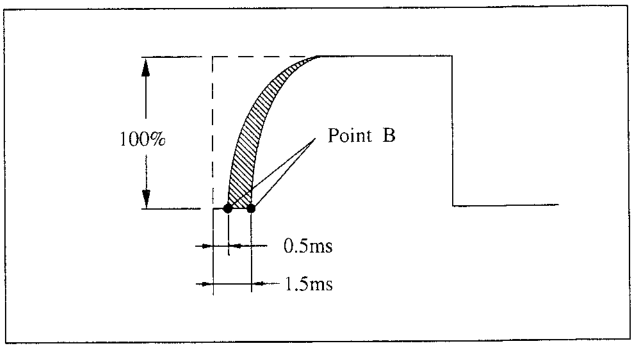


Fig. 9-46. Specification of T1 Guide Slantness Adjustment

4) If point B does not to satisfy the specification, adjust it as below:

(i) In case of ⓐ in Fig. 9-48.
This shows that the tape has too high tension at the lower part. Adjust to reduce the tension. Slightly loosen adjusting screw B in Fig. 9-43, and slightly tighten adjusting screw A. Then, tighten adjusting screw B, and adjusting screw A with a tightening torque of 29.4×10^{-2} N·m (3kgf·cm).

Lower the T2 guide again, returning it to the normal position. And then raise it to a point where the envelope no longer changes, and check that point B satisfies the specification.

In case of ⓐ, too high tension at the lower part of tape can also be recognized by tape curl at the upper flange of the T2 guide that tend to occur in the tape as shown in Fig. 9-49.

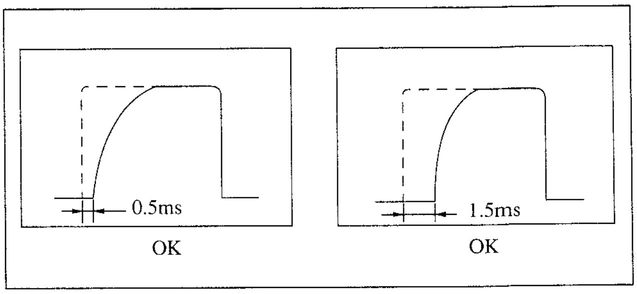


Fig. 9-47. OK

(ii) In case of ⓑ in Fig. 9-48
This shows that the tape tension at lower part is too low tension. Adjust to increase the tension.

Slightly loosen adjusting screw A in Fig. 9-43, and slightly tighten adjusting screw B. Then, tighten adjusting screw A, and adjusting screw B with a tightening torque of 29.4×10^{-2} N·m (3kgf·cm).

Lower the T2 guide again, returning it to the normal position then raise it to a point where the RF envelope no longer changes. Check that point B satisfies the specification.

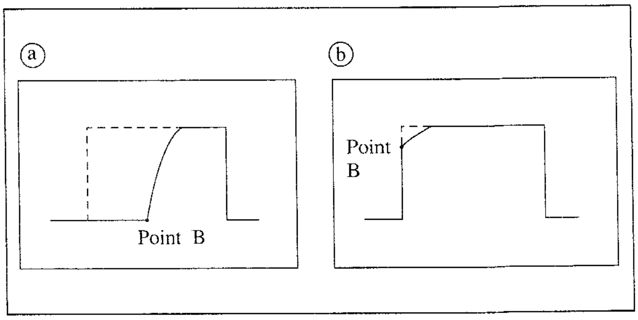


Fig. 9-48. NG

5) Unthread ER2-2 once and play it back again to make sure that the specification of 3) is satisfied If the result is NG, repeat the adjustment from step 3).

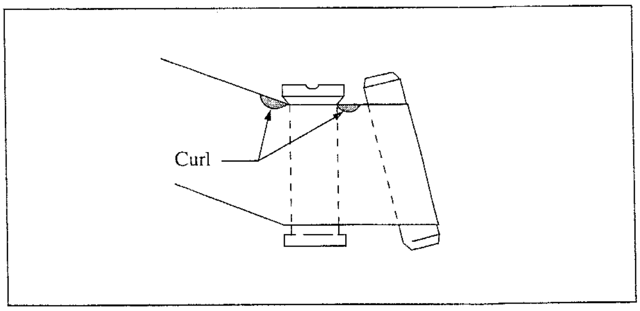


Fig. 9-49. Tape Path of T2 Guide

When checking the point B position by raising the T2 guide, tape moves up also at the CTL/TC/CUE stationary head. Then the CTL playback can go OFF TRACK and its output becomes low. If the CTL output level drops to about 0.6Vp-p, servo system is unlocked, SERVO LED on the control panel blinks and the RF envelope fluctuates.
In this situation, loosen the setscrew in Fig. 9-50, turn the head height adjusting screw counterclockwise in order to raise the stationary head assembly and increase the CTL playback output. (Normally about 1.0 to 1.3V.)

Note: If the damage of the top edge of TAPE (ER2-2) is heavily damaged enough to be seen, it will not show the correct value of tape tension (i. e., "higher tension at lower part of tape" in this adjustment.) accurately. In such a case, use an undamaged part.

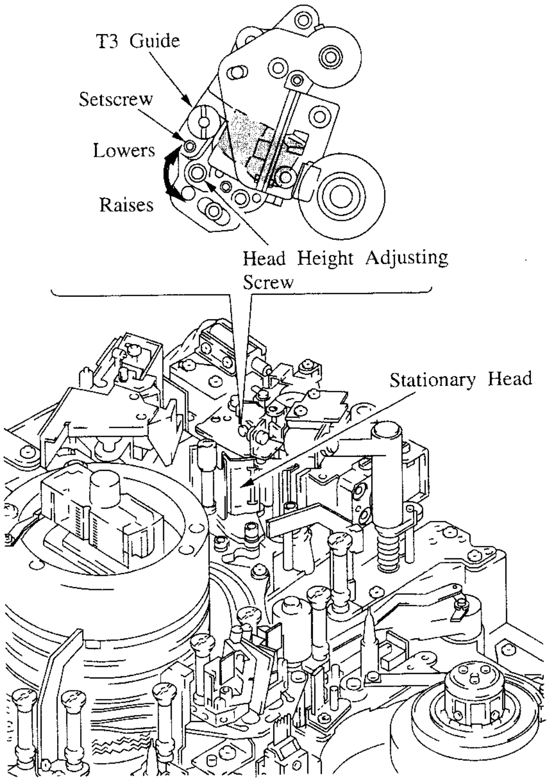


Fig. 9-50. Stationary Head Height Tentative Adjustment

⑲ T2 Guide Height Check and Adjustment

After completion of the T1 guide height adjustment, adjust the T2 guide height.

1) Set TRACKING to "VAR". Adjust the height of the T2 guide so that the portion (a) in Fig. 9-52 moves in parallel when the control knob (Fig. 9-38) on the control panel is turned to left and right. (Refer to Fig. 9-51)
   Note that the portion (b) in the illustration is influenced by the shape of the rabbet guide of the drum.
   Therefore, adjust so that the portion (a) move in parallel.

   If the portion (a) in Fig. 9-52 does not move in parallel, make the following adjustment.
   When the result is Fig. 9-53 (a), the T2 guide is too high. Therefore, lower its height.
   When the result is Fig. 9-53 (b), the T2 guide is too low. Therefore, raise its height.

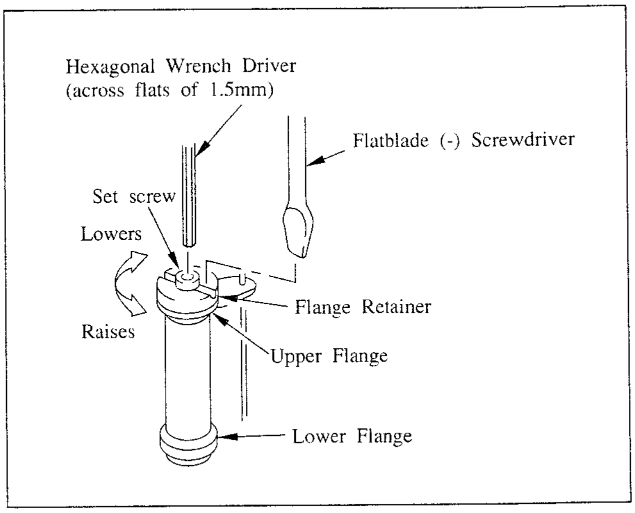
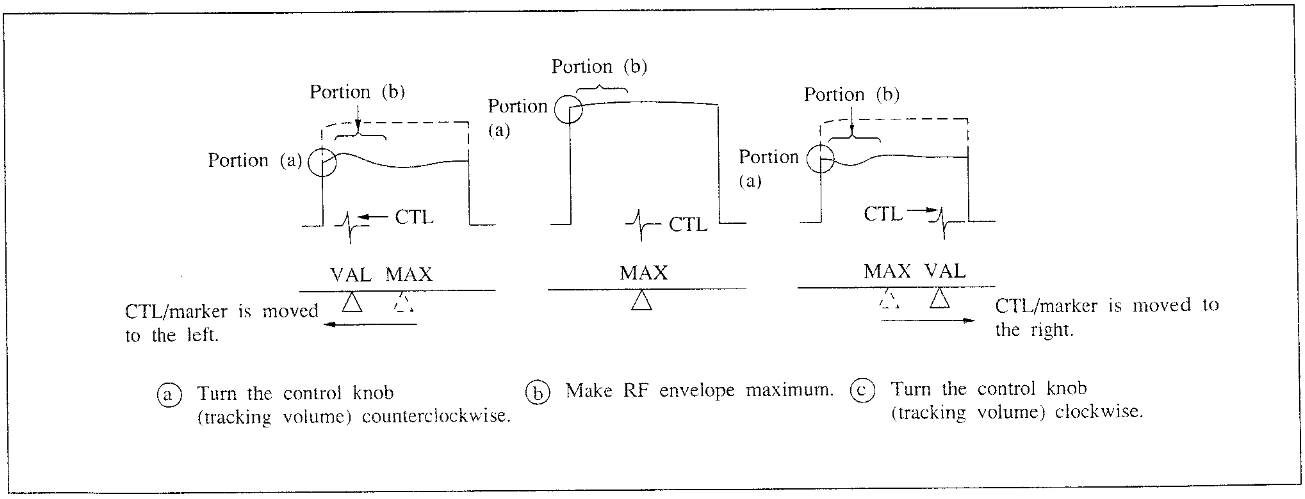

Hexagonal Wrench Driver
(across flats of 1.5mm)
Flatblade (-) Screwdriver
Set screw
Lowers
Raises
Flange Retainer
Upper Flange
Lower Flange

Fig. 9-51. T2 Guide Height Adjustment

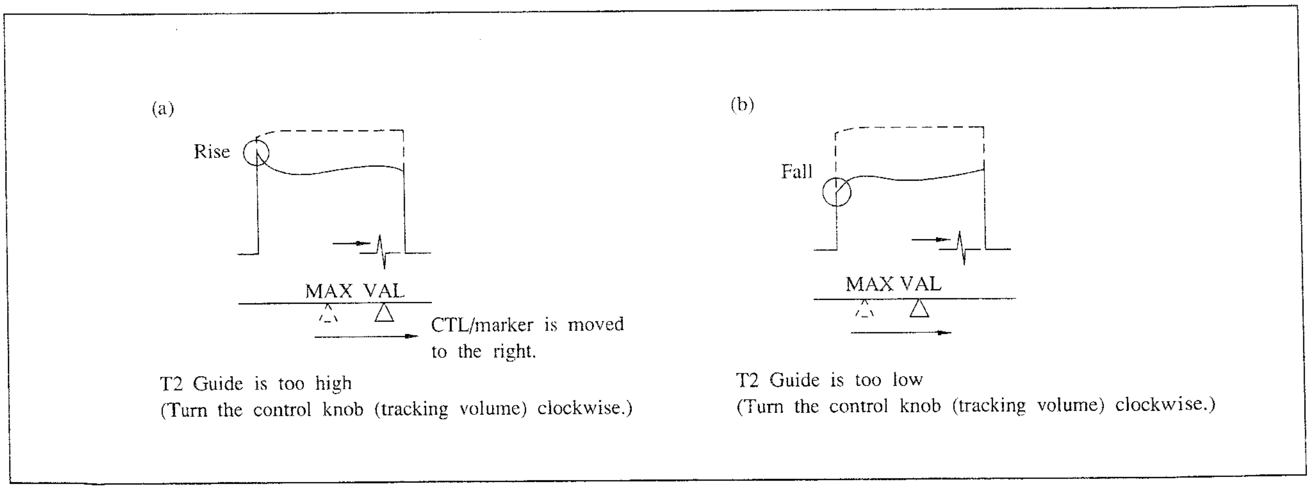

Portion (b)
Portion (a)
CTL
VAL MAX
CTL/marker is moved to the left.
Portion (b)
Portion (a)
CTL
MAX
Portion (b)
Portion (a)
CTL
MAX VAL
CTL/marker is moved to the right.

ⓐ Turn the control knob (tracking volume) counterclockwise.

ⓑ Make RF envelope maximum.

ⓒ Turn the control knob (tracking volume) clockwise.

Fig. 9-52. T2 Guide Height Check


(a)
Rise
MAX VAL
CTL/marker is moved to the right.
(b)
Fall
MAX VAL

T2 Guide is too high
(Turn the control knob (tracking volume) clockwise.)

T2 Guide is too low
(Turn the control knob (tracking volume) clockwise.)

Fig. 9-53. NG

2) After making the above adjustment, tighten the set screw shown in Fig. 9-51.

3) After tightening the set screw, repeat step 1) to make sure that the portion (a) in Fig. 9-52 moves in parallel. If the result is NG, repeat the adjustment from step 1).

4) Thread ER2-2 once and reproduce it again. Repeat step 1) once more to make sure that the portion (a) in Fig. 9-52 moves in parallel. If the result is NG, repeat the adjustment from step 1).

⑳ T3 Guide Height Adjustment (+1)

Be sure to perform this adjustment when ever T2 guide was touched (adjusted).

1) Loosen the setscrew. Turn the flange retainer to make tape curl at the lower flange.

2) Turn the flange retainer clockwise in order to lower the T3 guide. Then tighten the setscrew with a tightening torque of 58.8×10^{-2} N·m (6 kgf·cm) at the point where tape curl disappears.

3) After tightening the set screw, check the followings.
   - The RF envelop which was adjusted in the step (19) has not changed.
   - The lower flange of the T3 guide is producing neither a wrinkle, nor a curl.

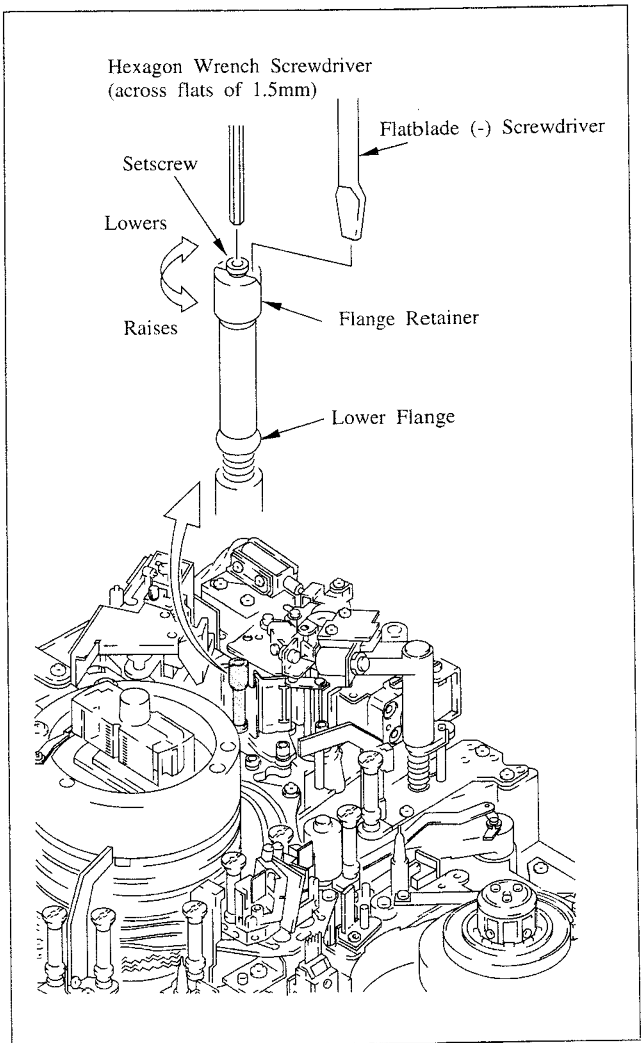

Hexagon Wrench Screwdriver
(across flats of 1.5mm)
Flatblade (-) Screwdriver
Setscrew
Lowers
Raises
Flange Retainer
Lower Flange

Fig. 9-54. T3 Guide Height Adjustment

㉑ Wrinkle Between T1 and T2 Guides (+1) Check

Check to see that the tape is not curled around upper flange of T2 guide as shown in Fig. 9-55.

If the result is NG, repeat the adjustment from step ⑱.

㉒ Then, change the setting from PLAY (+1) to VAR (–)

㉓ T2 and T3 Guides Tape Run Check (–1)

T2 guide

It should produce neither a wrinkle nor a curl.

T3 guide

A very small curl which is produced on the sides of the flange, not damaging a tape is acceptable. (However, make an adjustment to make the curl smallest.) If the tape is folded upon the flange (the tape runs over the flange) is NG.

If the result is NG, repeat the adjustment from step ⑱.

㉔ Tracking Check (+1)

1) Install ER2-2 and play it back at the TC 15 to 20 min portion.
2) Turn the control knob on the control panel until the RF envelope becomes the largest.
3) Make sure that the specification shown in Fig. 9-56 is satisfied. If it is not satisfied, repeat the step ⑫.

㉕ Tentative adjustment of T5, T6 and T7 Guides (+1)

1) Reproduce an ordinary-use tape.
2) Adjust the flange height as shown in Fig. 9-57 until the flanges of these guides produce no curl.

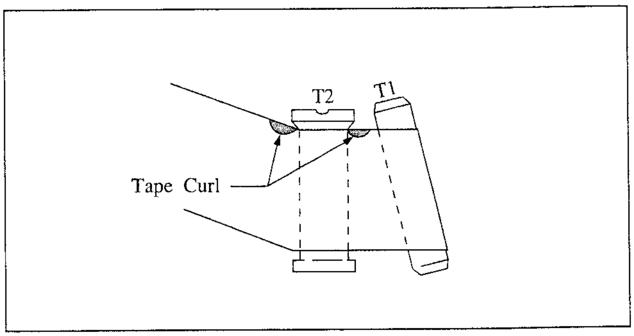
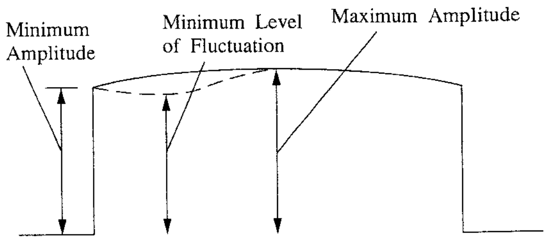

T2
T1
Tape Curl

Fig. 9-55. Curl Check Around Upper Flange of T2 Guide


Minimum Amplitude
Minimum Level of Fluctuation
Maximum Amplitude

Specification :

$$\frac{\text{Minimum amplitude (or minimum level of fluctuation, which ever is smaller)}}{\text{Maximum amplitude}} \times 100 \geqq 80\%$$

Fig. 9-56. Tracking Check

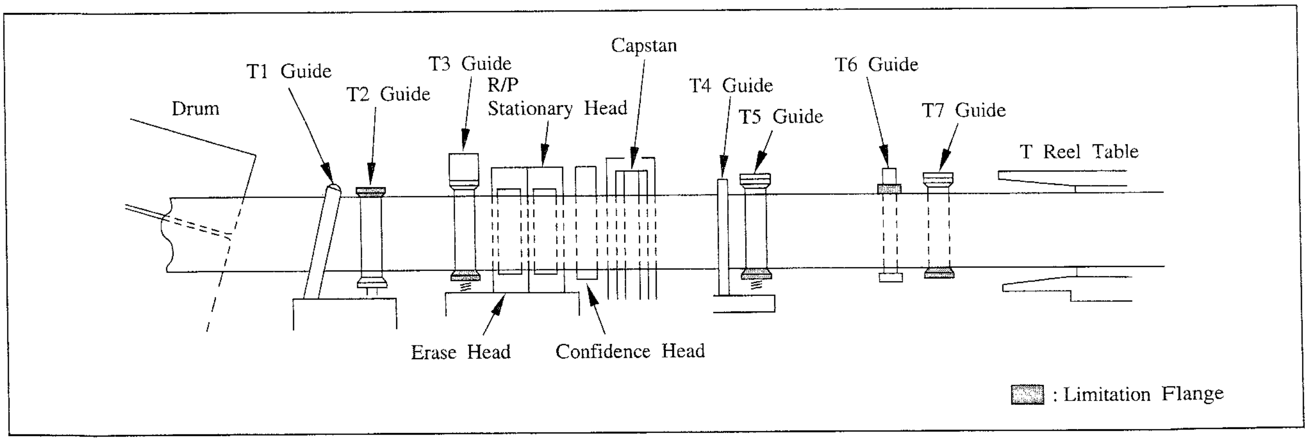

Drum
T1 Guide
T2 Guide
T3 Guide
R/P Stationary Head
Capstan
T4 Guide
T5 Guide
T6 Guide
T7 Guide
T Reel Table
Erase Head
Confidence Head
▨ : Limitation Flange

Fig. 9-57. Height of T-side Guides

㉖ Stationary Head R/P Azimuth Adjustment

Preliminary Information

Azimuth is adjusted by playing back the CUE track signal (10 kHz) of the alignment tape (ER2-2). Be sure to perform the ㉗ stationary head height adjustment after this adjustment is tried.

Note: The screws C and D in Fig. 9-55 are screws for the zenith adjustment. Never turn them.

Stationary head R/P azimuth adjustment

1) Connect TP-20 on AE-15 board to the oscilloscope. (Fig. 9-58.)

2) Play back the alignment tape (ER2-2, TC 0 to 30 min).

3) Check that tape does not curl on the T3 guide flange. If there is curl, adjust the height of the T3 guide.

4) As a preparation for the azimuth adjustment, check the head height. Here, check whether the CUE track output is the maximum, by the following procedure.
Check that the CUE track output always decreases when the tape edge portion (back coat side) between T2/T3 guides is pushed up and down with your finger, as shown in Fig. 9-59.
If the output increases when this portion is touched, loosen the head height lock screw (set-screw) and adjust the head height adjusting screw so that the output becomes maximum. (See ㉗ Stationary R/P Head Height Adjustment.)
After adjustment, tighten the head height lock screw (set-screw), and again check that the output is maximum.

5) Check to see if the CUE track output always becomes small when tape near the screws A and B (azimuth adjusting screws) shown in Fig. 9-59 are pressed. If the result is OK, go to step ㉗.
If the result is NG, go to step 6).

6) After step 5), tighten the screw which increases the CUE track output until the output reaches the maximum. The tightening torque is 58.8×10^{-2} N·m (6 kgf·cm). If it cannot be tightened, loosen the opposite screw and tighten this screw again.

7) Repeat step 6) until the specification of step 5) is satisfied.

8) Check step 4).
If it is NG, repeat step 4) and onwards.

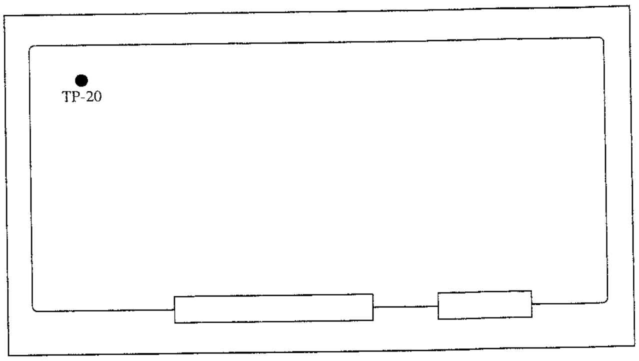


Fig. 9-58. AE-15 Board

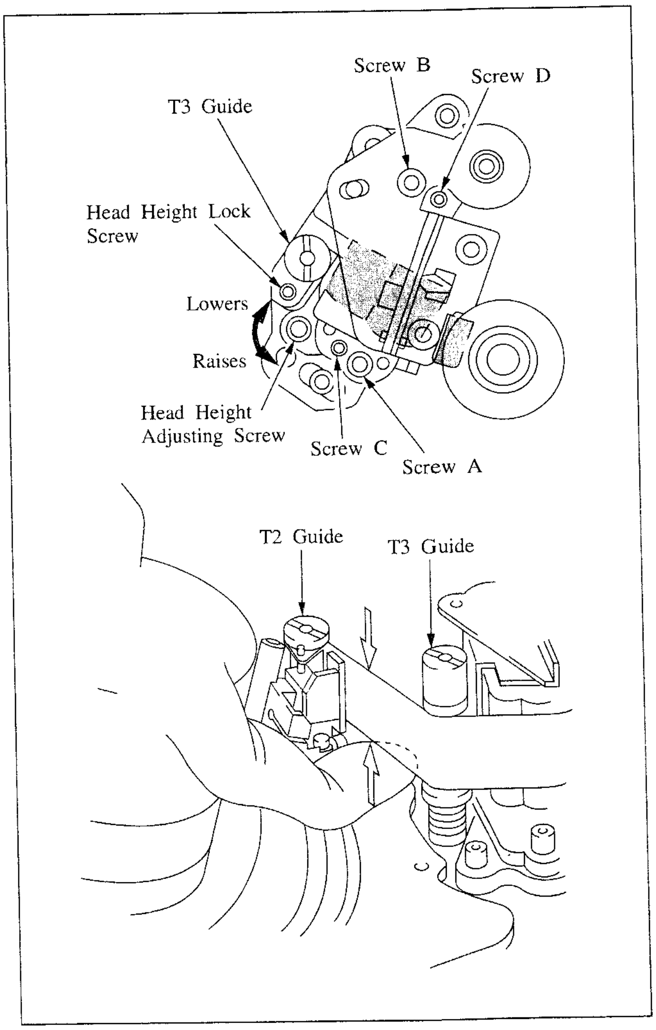


Fig. 9-59. Stationary Head

㉗ Stationary R/P Head Height Adjustment

Preliminary Information

CTL head height check and adjustment can be performed by playing back the CTL signal portion of an alignment tape (ER2-2).

Stationary Head Height Check

1) Connect oscilloscope to TP19 on AE-15 board.
Set oscilloscope to 100 mV/DIV.

2) Play back the alignment tape. (ER2-2, TC 0 to 30 min)

3) Confirm that the tape runs in contact with the lower flange of the T3 guide without curl.
If there is a curl, loosen the setscrew on the top of the T3 guide and perform adjustment by turning the flange holder.
After the completion of adjustment, tighten the setscrew.

4) Confirm the amplitude of CTL signal by pushing up or pressing down the tape edge (back-coated side) between T2 and T3 guides with finger.
When the amplitude always becomes small by pushing up or pressing down the tape edge, this adjustment is not necessary.
If not, perform the following adjustment.
(However, when changing the stationary head height with step ⑱ T1 Guide Slantness Check/Adjustment, be sure to perform the next adjustment. Also, when changing the T3 guide height, perform the next adjustment.)

Stationary Head Height Adjustment

Note: The screws C and D in Fig. 9-55 are screws for the zenith adjustment. Never turn them.

5) Loosen the head height lock screw shown in Fig. 9-60.
- Hexagon Wrench Screwdriver:
(Diameter is 1.5mm)

6) Turn the head height adjusting screw so that the amplitude of RF envelope signal becomes maximum.
- Hexagon Wrench Screwdriver:
(Diameter is 2.5mm)

7) Tighten the head height lock screw loosened in step 5) and confirm that the amplitude of RF envelope signal is maximum.

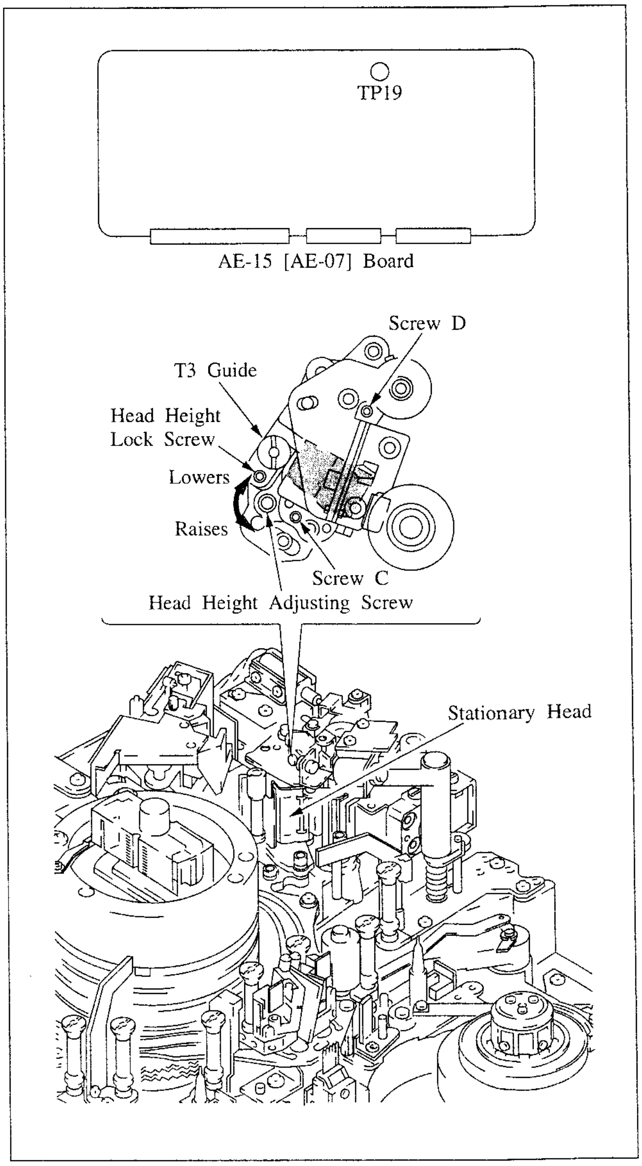


Fig. 9-60. Stationary Head Height Adjustment

[Know-how]

(Because the head height tends to raise when the setscrew is tightened, the following adjustment is proposed.)

1) Turn the head height adjusting screw so that the lower edge (Fig. 9-61 point A) of the CTL pulse goes down as lower as possible, in other words, maximize the amplitude. Next, turn the adjusting screw in the clockwise direction and stop where the lower edge of the CTL pulse becomes 10 to 15 mV higher than the lowest position.

2) After tightening the setscrew, check that the envelope amplitude becomes maximum. If not, go to readjustment.

㉘ Stationary Confidence Head Height Adjustment

Preliminary Information

This adjustment is to match the height of the CTL, T/C tracks of the stationary confidence head to those of the CTL, T/C tracks of the stationary R/P head.

Height Adjustment

1) Connect TP-1 (CTL) and TP-5 (T/C) on ED-24 board to CH-1 and 2 of the oscilloscope (Fig. 9-62).

2) Set to the recording condition using a commercially available cassette tape.

3) Loosen the confidence height lock screw. (Fig. 9-63)

4) Rotate the confidence height adjusting screw so that the CTL output is maximum and adjust the VAR control of oscilloscope so that signal is 5 DIV on the oscilloscope.

5) Rotate the confidence height adjusting screw so that the T/C output is maximum and adjust the VAR control of oscilloscope so that signal is 5 DIV on the oscilloscope.

6) Rotate the confidence height adjusting screw so that the CTL output and the T/C output becomes the same level. (Fig. 9-63)

7) Tighten the confidence height lock screw.

8) After tightening, check that the level that was adjusted in step 6) has not changed. If the result is NG, repeat step 6).

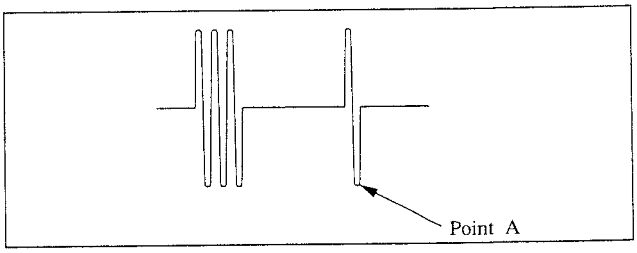


Fig. 9-61. CTL Pulse

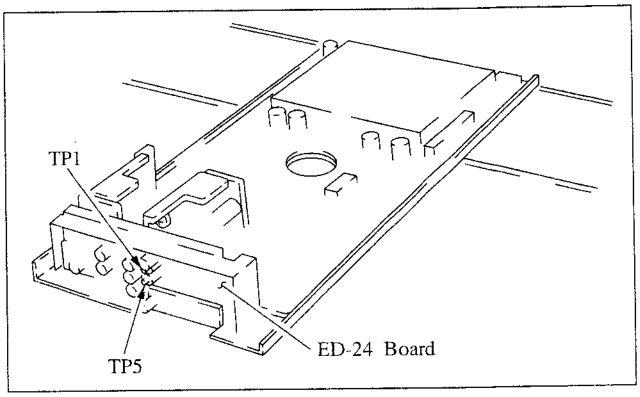


Fig. 9-62. ED-24 Board

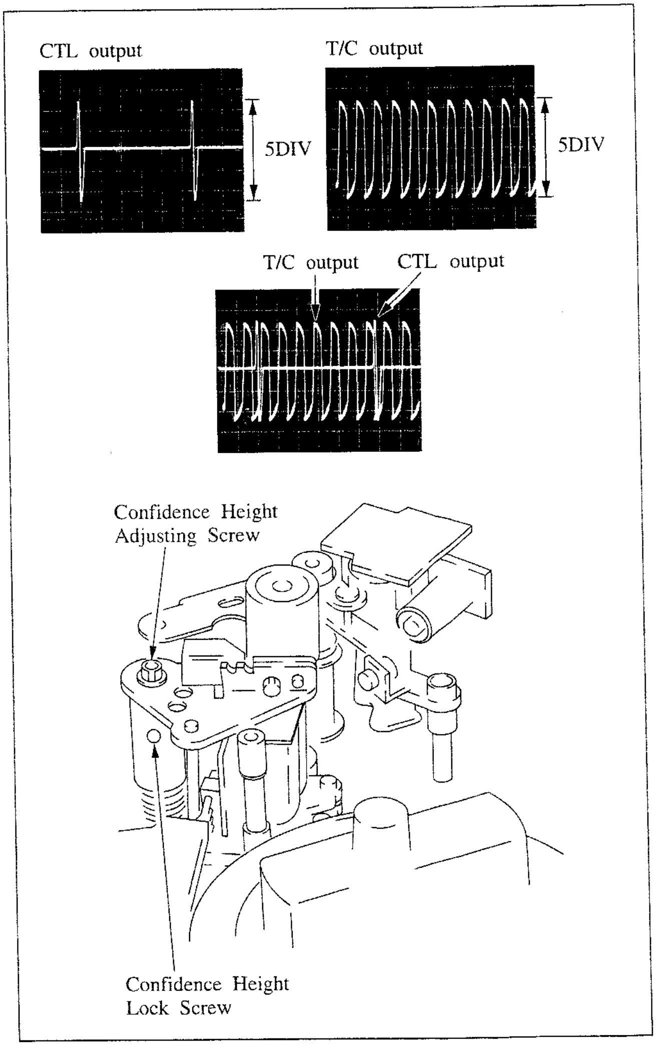

CTL output
T/C output
5DIV
5DIV
T/C output
CTL output
Confidence Height Adjusting Screw
Confidence Height Lock Screw

Fig. 9-63. Confidence Head Height Adjustment

㉙ CTL Head Position Adjustment

Preliminary Information

A. Purpose of this adjustment is to maintain tape interchangeability by adjusting the longitudinal distance between the CTL head and rotary head against the recorded pattern of an alignment tape (ER2-2).

B. If the CTL head is moved, the PG phase changes. Thus be sure to perform step ㉚ PG Phase Adjustment after performing the CTL head position adjustment.

Adjusting method:

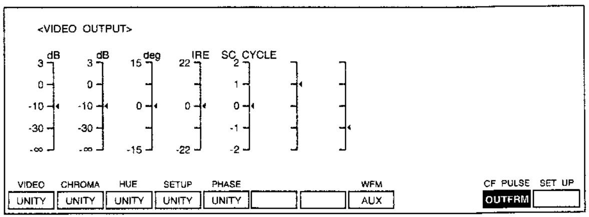
1) Connecting to Oscilloscope
   CH-1 : TP101 (REC CH-A OUT) on REC-11 board
   CH-2 : TP10 (CTL OUT) on AE board
   Trigger : CF PULSE OUT (BNC connector) on the control panel

2) Press the keys on the control panel in the following sequence to change the setting of CF PULSE to "OUT FRM".
   BKDV-101: Press the VIDEO OUT key. Then, press the F11 key to select "OUT FRM'. (Fig. 9-64.1)
   BKDV-200 series:
   Press the SHIFT + SET UP key.
   Select 209. [CF PULSE SELECT] by turning the search dial.
   Press the > key to move the cursor to the right. Then, press the ∧ key to select "OUT FRM". (Fig. 9-64.2)

3) Insert an alignment tape (ER2-2), playback the CH-A recorded portion (TC 0 to 20 minutes).

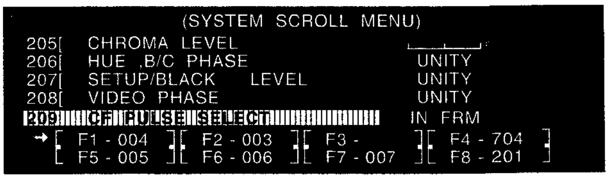
1. BKDV-101

OUT FRM



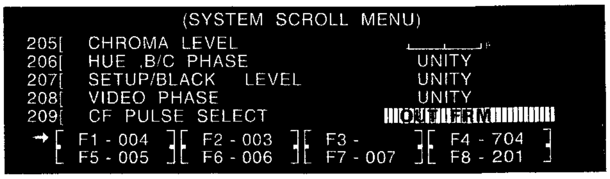
VIDEO UNITY
CHROMA UNITY
HUE UNITY
SETUP UNITY
PHASE UNITY
WFM AUX
CF PULSE OUTFRM
SET UP

2. BKDV-200 Series



```
              (SYSTEM SCROLL MENU)
205[  CHROMA LEVEL
206[  HUE .B/C PHASE                     UNITY
207[  SETUP/BLACK    LEVEL               UNITY
208[  VIDEO PHASE                        UNITY
209[  CF PULSE SELECT                    IN FRM
 →[  F1 - 004  ][  F2 - 003  ][  F3 -       ][  F4 - 704  ]
  [  F5 - 005  ][  F6 - 006  ][  F7 - 007  ][  F8 - 201  ]
```

Fig. 1



```
              (SYSTEM SCROLL MENU)
205[  CHROMA LEVEL
206[  HUE .B/C PHASE                     UNITY
207[  SETUP/BLACK    LEVEL               UNITY
208[  VIDEO PHASE                        UNITY
209[  CF PULSE SELECT                    OUT FRM
 →[  F1 - 004  ][  F2 - 003  ][  F3 -       ][  F4 - 704  ]
  [  F5 - 005  ][  F6 - 006  ][  F7 - 007  ][  F8 - 201  ]
```

Fig. 2

Fig. 9-64. Indication of Control Panel Display

4) Adjust the amplitude of the RF envelope center to the maximum by the following procedure. (Fig. 9-66)
   BKDV-101: Press keys on the control panel in the following sequence.
   TEST, F5 (RF)
   Press the F4 key to change the setting of TRACKING to "VAR". Turn the control knob on the control panel for adjustment.
   BKDV-200series:
   Pull the control knob on the control panel to VARIABLE and turn it.

5) Then, change the setting of TRACKING to "FIX" by the following procedure and check to see if the amplitude of the RF envelope center changes.
   BKDV-101: Press the F1 key on the control panel.
   BKDV-200 series: Press the control knob.

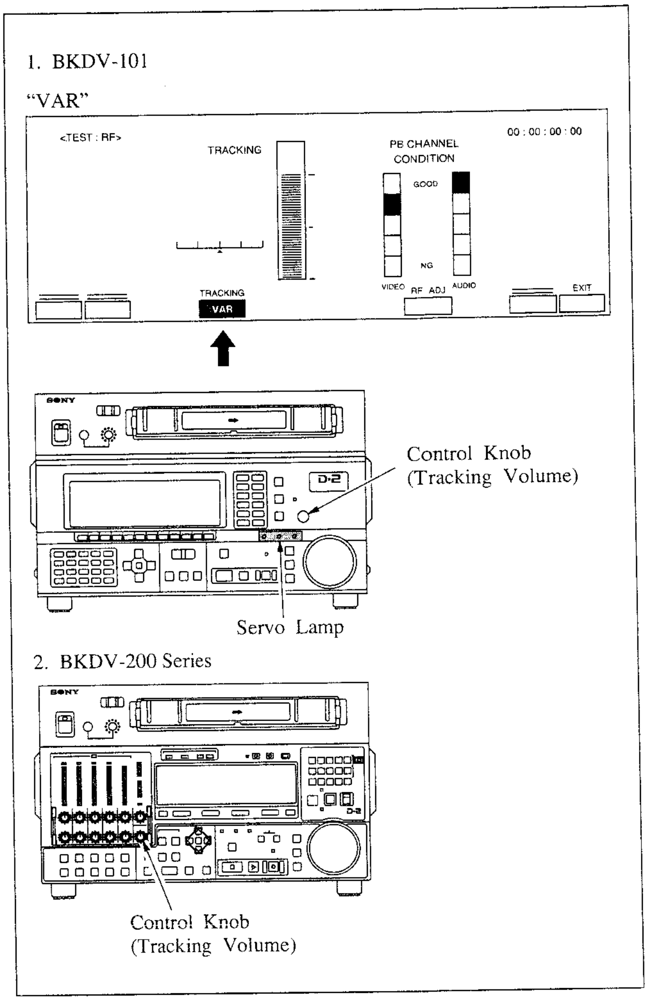

1. BKDV-101
"VAR"
<TEST : RF>
TRACKING
PB CHANNEL CONDITION
00 : 00 : 00 : 00
GOOD
NG
VIDEO
RF ADJ
AUDIO
EXIT
TRACKING
VAR
Control Knob (Tracking Volume)
D-2
Servo Lamp
2. BKDV-200 Series
Control Knob (Tracking Volume)

Fig. 9-65. Location of Control Knob

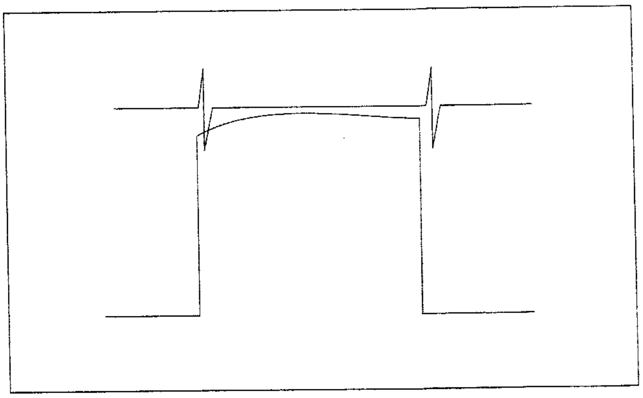


Fig. 9-66. RF Envelope

6) If changing, loosen the two CTL position adjusting screws for 1/4 to 1/2 turn with hexagon wrench screwdriver (Diameter is 2.5 mm). (See Fig. 9-67)

7) Insert the screwdriver into the adjusting hole, move it in the arrow G direction until the center of RF envelope becomes maximum in " FIX" condition.

8) Tighten the two screws that are loosened in step 6).

9) Repeat step 4) and step 5) and make sure that the RF waveform amplitude does not change.
If the result is NG, repeat step 6) - step 8).

10) Perform ㉚ PG Phase Adjustment.

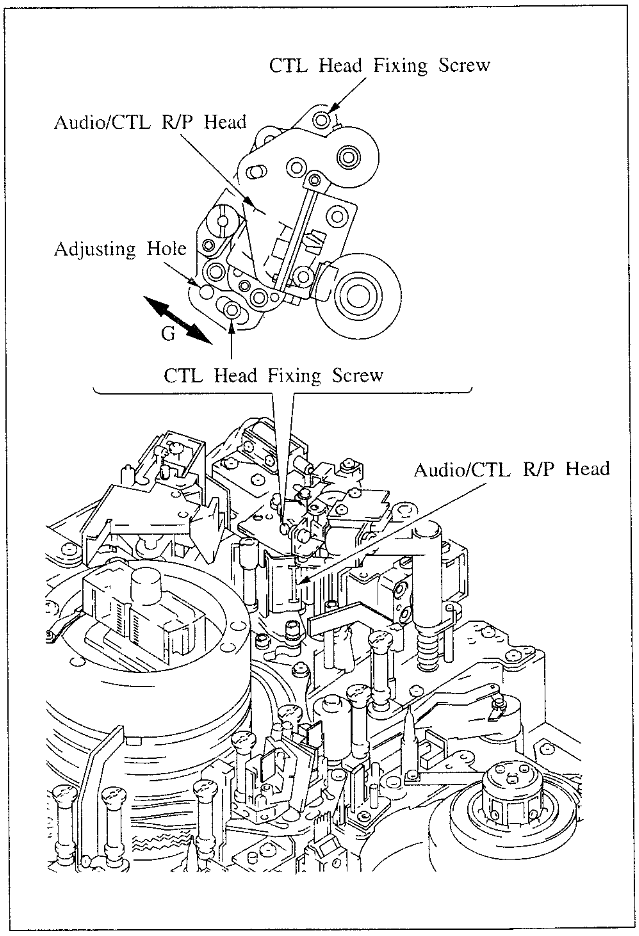

CTL Head Fixing Screw
Audio/CTL R/P Head
Adjusting Hole
G
CTL Head Fixing Screw
Audio/CTL R/P Head

Fig. 9-67. CTL Head Position Adjustment

㉚ PG Phase Adjustment

Preliminary Information

A. Purpose of this adjustment is to maintain tape interchangeability by adjusting the rotary head phase in the direction of track with reference to the recorded pattern of the alignment tape (ER2-2).

B. If the position of the CTL head has been adjusted, be sure to perform this adjustment. Furthermore, be sure to check the position of the CTL head after completing this adjustment.

Check and Adjustment

(1) Connecting to Oscilloscope

CH-1 : TP102 (REC CH-A OUT) on REC-11 board
CH-2 : TP2 (REF, TIMING) on AE board
Trigger : CF PULSE OUT (BNC connector) on the control panel

(2) Press the keys on the control panel in the following sequence to change the setting of CF PULSE to "IN CF".

BKDV-101: Press the [VIDEO OUT] key. Then, press the [F11] key to select "IN CF".

BKDV-200 series:

Press the [SHIFT] + [SET UP] key.

Select 209. [CF PULSE SELECT] by turning the search dial.

Press the [>] key to move the cursor to the right. Then, press the [∧] key to select "IN CF".

(3) Install the alignment tape (ER2-2) and play back its TC 15 to 20 min portion.

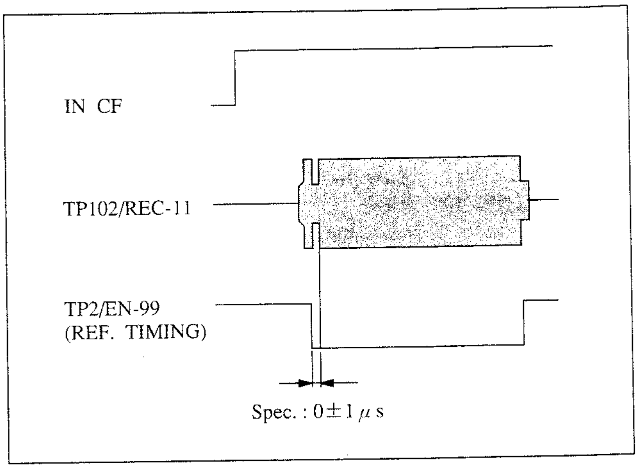


Fig. 9-68. RF Envelope

(6) Press the keys on the control panel in the following sequence.

BKDV-101 : [TEST], [F6] (CHECKER) [F2] (SV), [F2] (B), [1], [5], [SET]

The display changes to the condition shown in the fig. 9-69 (a).

BKDV-200 series:

Press the keys on the control panel in the following sequence.

1) [SHIFT] + [SET UP]
2) [ENTRY]+center key+search dial (or [V] key) to enter the <TEST> menu. Select 807. [CHEKER MODE] by pressing the [V] key or by turning the search dial.
3) Press the [>] key to move the cursor to EXECUTE.

   Then, press the [Λ] key to enter the mode.
4) Press [SHIFT] , [F3] (BOARD) to select "SV".
5) Entry B15 by pressing the monitor select keys in the following sequence.

   [INPUT CHECK] + [1] (B), [1], [5] , [SET]

   The character B can be also input by the search dial with the [F1] (ALPH SET) key. (Refer to APPENDIX 7.)

(7) Check the phases of the RF envelope and REF, TIMING pulse shown in Fig. 9-68.

Specification : 0 ± 1 μsec.

Check the data shown on the display at this time.

Data : NTSC : 06B0~26C0 (HEX)
PAL : 07A0~27B0 (HEX)

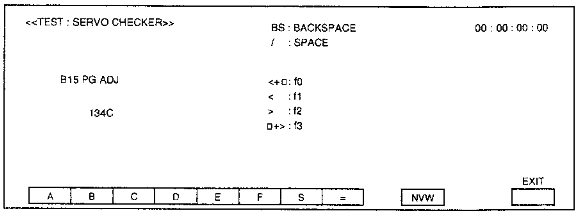
i) When both the phase and the data are OK:
   Set to STAND BY OFF and reset VTR by the following procedure.

   BKDV-101: [F8] (=) , [0], [SET]

   BKDV-200 series: [SHIFT], [F4] (=), [0], [SET]

   Then, go to 14).
ii) When the phase does not meet the specification:
   Press the [<] and [>] keys on the control panel, and adjust the phases. After adjusting, check the data on the display.
   If it is OK, proceed to step 8).
iii) When the data does not meet the specification:
   Reset the system, and repeat from step 6).

(a) BKDV-101


<<TEST : SERVO CHECKER>>
BS : BACKSPACE
/ : SPACE
00 : 00 : 00 : 00
B15 PG ADJ
<+□: f0
< : f1
> : f2
□+> : f3
134C
EXIT
A
B
C
D
E
F
S
=
NVW

(b) BKDV-200 Series

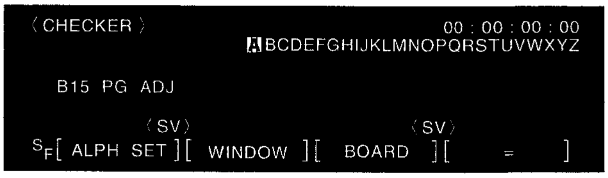

〈CHECKER〉
00 : 00 : 00 : 00
ABCDEFGHIJKLMNOPQRSTUVWXYZ
B15 PG ADJ
〈SV〉
〈SV〉
SF[ALPH SET][WINDOW][BOARD][=]

Fig. 9-69. Indication of Control Panel Display

(8) Set the unit into the STANDBY OFF mode.

(9) Press the keys on the control panel in the following sequence.

BKDV-101 : F12 (EXIT), F1 (SP), F10 (NVW), SET

Keep pressing the / key until "PUSH NVWR SW" appears on the display.

BKDV-200 series :

1) Press SHIFT, F3 (BOARD) to change the display which was set by step 6) to "SP".

2) Press SHIFT, F4 (NVW) and SET.

(NVW
A801 xx-xx will be displayed.)

3) Keep pressing F3 (/) until "PUSH NVWR SW" is displayed.

The following addresses may be displayed before "PUSH NVWR SW" appears.
"A8D1 XX-XX"
"A8D2 XX-XX"
"A8FE XX-XX"
"A8FF XX-XX".
Check that addresses other than the above are not displayed.
When other addresses are displayed, reset VTR by the procedure of 7) (i)
Return the menu setting to "HOME", and repeat from step 5).

(10) When "PUSH NVWR SW" is displayed, press the S71 (NVWR) switch on SP-15 board (DVR-20/C20/20P) or SSP-07 board (DVR-28/28P) shown in Fig. 9-70, and check that "READY" is displayed.

(11) Press the PLAY button on the control panel, and set to the playback condition.

(12) Check that the specification of step 7) is met.

(13) Press the keys on the control panel in the following sequence.

BKDV-101 : F8 (=), 0 , SET

BKDV-200 series : SHIFT, F4 (=), 0, SET

Return the menu setting from the checker mode to the home condition.

(14) Check the position of the CTL head.
(Refer to step ㉙, CTL Head Position Adjustment.)

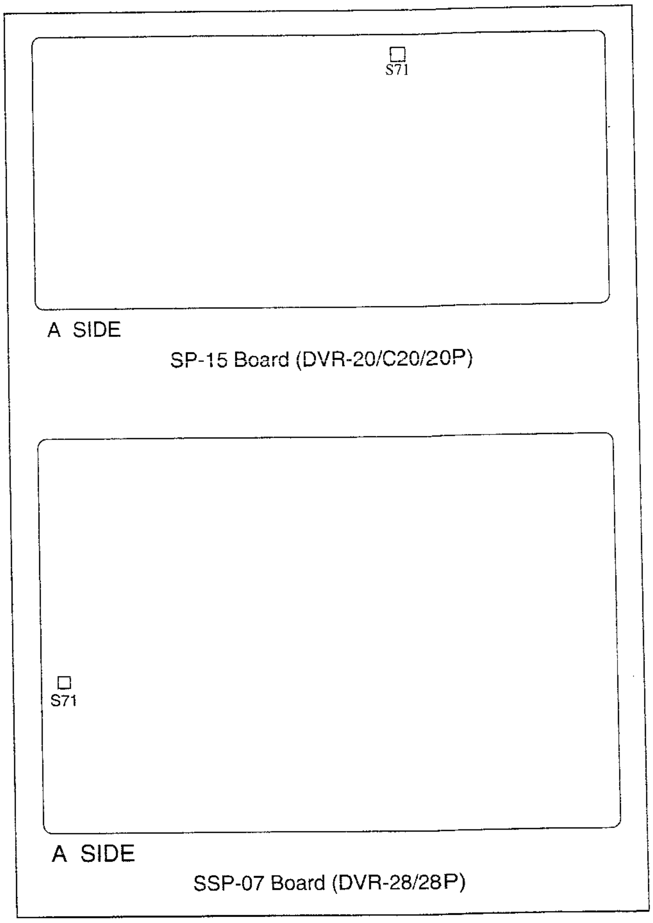


Fig. 9-70.

㉛ Self Recording/Playback Waveform Check

This procedure is performed to check the condition of the tape-to-video head contact during self record/playback.

(1) Connect WFM OUT on the Control Panel to CH-1 of the oscilloscope and press keys on the control panel in the following sequence.

BKDV-101: Press VIDEO OUT on the control panel and set WFM to "ENV A/C" by pressing F8. As a result, Ach and Cch will be output. (Fig. 9-71)
If WFM is set to "ENV B/D", Bch and Dch will be output. If it is set to "ENV ALL", the A, B, C and D channels will be output simultaneously.

BKDV-200/201: Ach and Cch will be output by pressing A/C of the Monitor Select key. Bch and Dch will be output by pressing B/D. The A, B, C and D channels will be output simultaneously by pressing both A/C and B/D.

Moreover, each channel output are also output from TP102 (A/C ch), and TP101 (B/D ch) on the DT16 board.

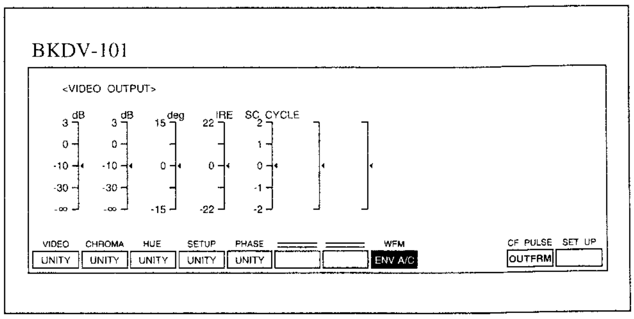

BKDV-101
<VIDEO OUTPUT>
dB
3
0
-10
-30
-∞
dB
3
0
-10
-30
-∞
deg
15
0
-15
IRE
22
0
-22
SC CYCLE
2
1
0
-1
-2
VIDEO
UNITY
CHROMA
UNITY
HUE
UNITY
SETUP
UNITY
PHASE
UNITY
WFM
ENV A/C
CF PULSE
OUTFRM
SET UP

Fig. 9-71.

(2) Set the function keys on the control panel to the following.

BKDV-101 : Press VIDEO IN key. Select the VIDEO into the "INT SG" by pressing the F7. Select the INT SG into the "CB FULL" by pressing F8. (Fig. 9-72)

BKDV-200/201: (1) SET UP
(2) Select [202 VIDEO INPUT SELECT] by turning the search dial.
(3) Press > and select the VIDEO into the "INT, SG" by pressing ∧.
(4) Press < and select into the 203 [VIDEO INPUT INTERNAL SG] by pressing ∨.
(5) Press > and select the INT SG into "CB FULL" by pressing ∧.

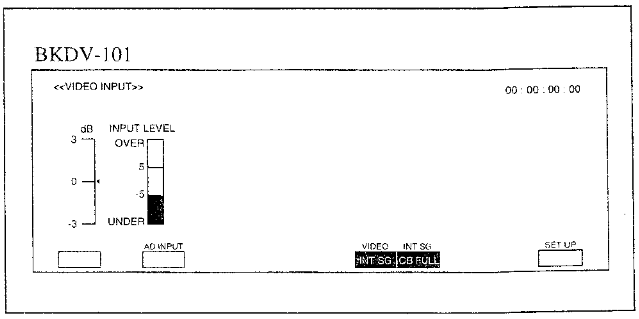

BKDV-101
<<VIDEO INPUT>>
00 : 00 : 00 : 00
dB
3
0
-3
INPUT LEVEL
OVER
5
-5
UNDER
AD INPUT
VIDEO
INT SG
INT SG
CB FULL
SET UP

Fig. 9-72.

BKDV-101 : Press AUDIO IN and SET UP. Select the DA-1 through DA-4 into the "INT SG" by pressing F1 through F4.

BKDV-200/201: (1) SHIFT + SET UP
(2) Turn the Search Dial and select into the 305 [DA ALL INPUT SELECT].
(3) Press > and select the DA1 through DA4 into the " INT SG".

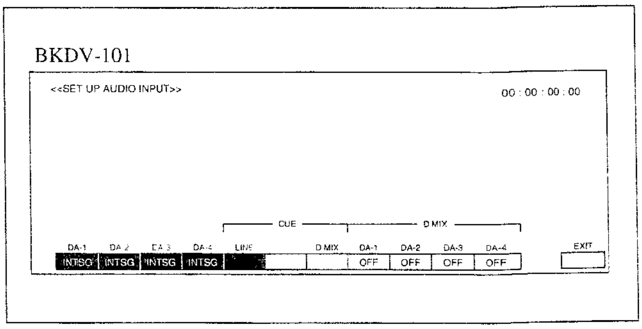

BKDV-101
<<SET UP AUDIO INPUT>>
00 : 00 : 00 : 00
CUE
D MIX
DA-1
INTSG
DA-2
INTSG
DA-3
INTSG
DA-4
INTSG
LINE
D MIX
DA-1
OFF
DA-2
OFF
DA-3
OFF
DA-4
OFF
EXIT

Fig. 9-73.

(3) Input CF PULSE OUT of the connector panel to oscilloscope as trigger signal. TP72 of SP-15 board (DVR-20/C20/20P) or SSP-07 board (DVR-28/28P) can also be used as trigger input.

(4) Press the keys in the following procedure to change the setting of CF PULSE to "OUT FRM".

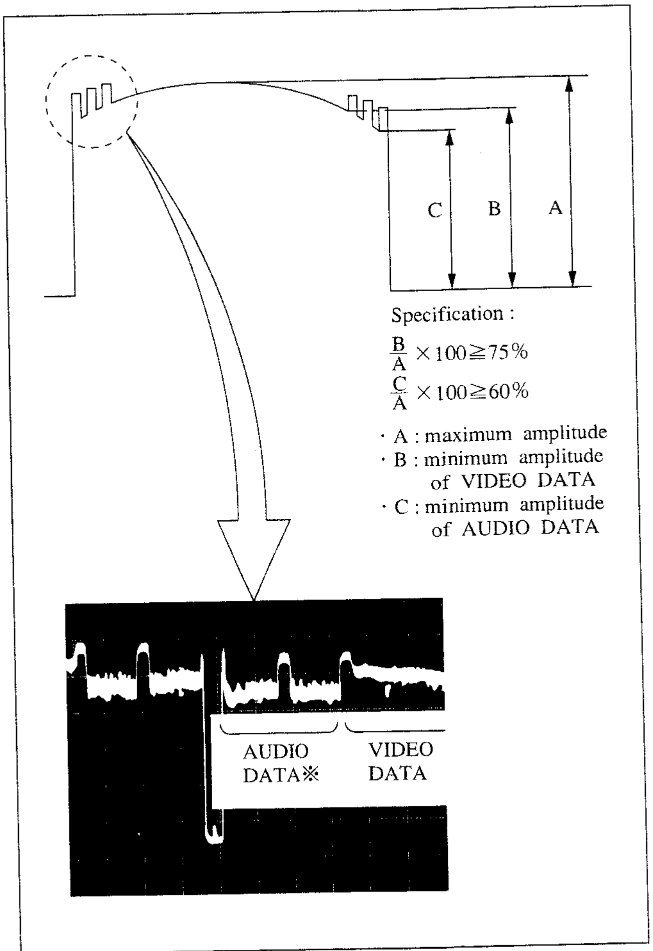
BKDV-101 : Press the $\boxed{\text{VIDEO OUT}}$ key. Then, press the $\boxed{\text{F11}}$ key to select "OUT FRM".

BKDV-200 series :

Press the $\boxed{\text{SHIFT}}$ + $\boxed{\text{SET UP}}$ key.
Select 209. [CF PULSE SELECT] by turning the search dial. Press the $\boxed{>}$ key to move the cursor to the right. Press the $\boxed{\wedge}$ key to select "OUT FRM".

(5) Perform recording on the tape that is prepared for self recording, playback this self-recorded section and check the envelope waveform of the A to D channels.
Make sure that the specification shown in Fig. 9-74 is satisfied.

(6) If the specifications are not satisfied, perform the adjustments again, according to the adjustment flowchart in Section 9-2.



Specification :

$\frac{B}{A} \times 100 \geqq 75\%$

$\frac{C}{A} \times 100 \geqq 60\%$

- A : maximum amplitude
- B : minimum amplitude of VIDEO DATA
- C : minimum amplitude of AUDIO DATA

Fig. 9-74. Self Recording/Playback Waveform Check

9-3-4. PROCEDURE 3 T-side Tape Path Adjustment

Preliminary Information

1. A tape curl or wrinkle around T5 guide in PLAY mode can be reduced by adjusting T5 guide. A tape curl or wrinkle around T5 guide in VAR (-1) mode can be reduced by adjusting T6 and T7 guides.
2. A tape curl or wrinkle around T6 and T7 guides in PLAY and VAR (-1) modes should equally diffuse to both guides.

㉜ Playback (+1)

Play back a commercially available tape which is free from damage.

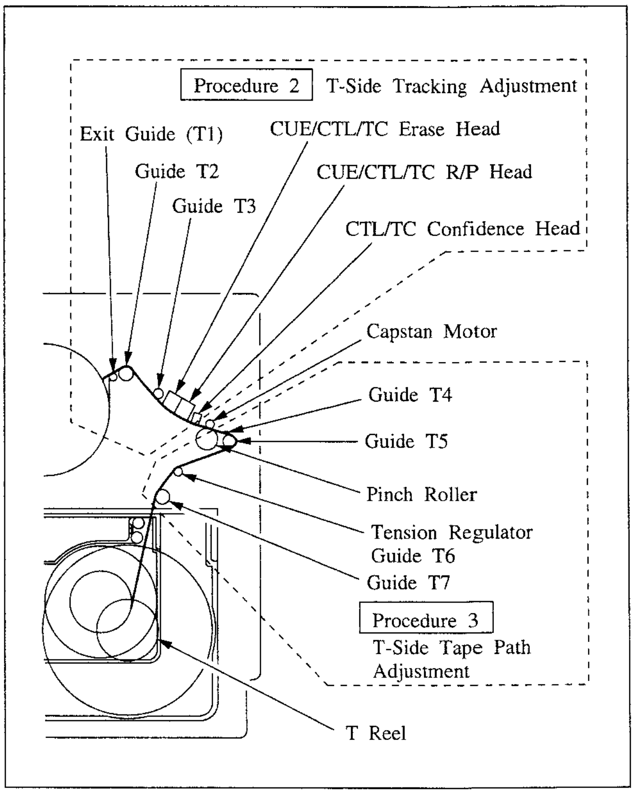

Procedure 2
T-Side Tracking Adjustment
Exit Guide (T1)
CUE/CTL/TC Erase Head
Guide T2
CUE/CTL/TC R/P Head
Guide T3
CTL/TC Confidence Head
Capstan Motor
Guide T4
Guide T5
Pinch Roller
Tension Regulator
Guide T6
Guide T7
Procedure 3
T-Side Tape Path Adjustment
T Reel

Fig. 9-75. T-side Tape Path System

㉝ T5, T6, and T7 Guides Height Check (+1)

T5 Guide

Be sure that there is no tape curl or wrinkle. However there is a possibility to generate wrinkle due to pinch roller at the pinch roller side of T5 guide. At this moment this wrinkle is OK as long as it is free from tape damage.

T6 and T7 Guides

As shown in Fig. 9-76 (a), minute tape curl at a side of flange is no problem. However, adjustment is needed to minimize curl or wrinkle.

As shown in Fig. 9-76 (b), it is problem when a tape is folded on flange (It is the condition that a tape runs over the flange.)

Note: Since T7 guide uses a barrel-shaped type roller, a wrinkle around the middle of tape due to a barrel-shaped type can be ignored. However, it is NG that a wrinkle caused by pressing down the tape edge with the flange.

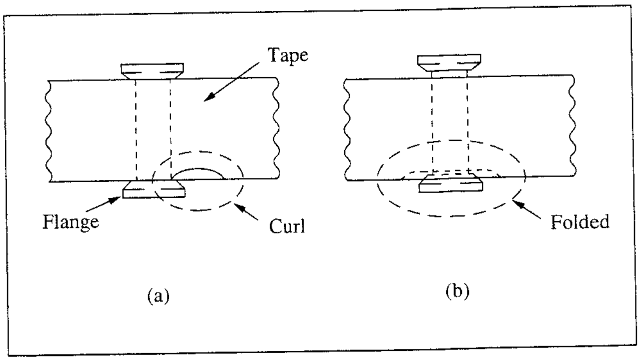


Fig. 9-76. Tape Curl Check

㉞ T5, T6, and T7 Guides Height Adjustment (+1)

If it is NG with step ㉝, turn the flange holder of T5 guide in the counterclockwise direction to make tape curl or wrinkle at the lower flange. Next, turn it in the clockwise direction and stop to tighten the setscrew with tightening torque of 58.8×10^{-2} N·m (6 kgf·cm) where there is no tape curl or wrinkle.

㉟ Set the unit into VAR (-1) mode from PLAY (+1) mode.

Play back a commercially available tape which is free from damage, in VAR (-1) mode.

㊱ T5, T6 and T7 Guides Tape Path Check (-1)

T5 Guide

Check that there is almost no wrinkle and curl on tape.

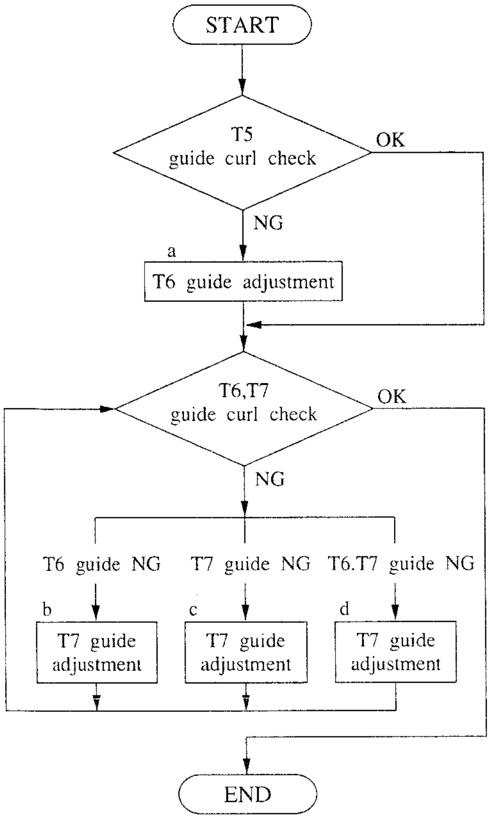
T6 and T7 Guides

As shown in Fig. 9-76 (a), minute tape curl at a side of flange is no problem. However, adjustment is needed to minimize the curl or wrinkle. As shown in Fig. 9-76 (b), it is problem when a tape is folded on flange (the condition that a tape runs over the flange.)

㊲ T6 and T7 Guides Height Adjustment (-1)

If the check in step ㊱ is NG, carry out the following adjustments. Do not adjust the T5 Guide.

1) Adjust the limitation flanges of the T6 and T7 guides as shown in the Fig. 9-77 (a) according to the following flowchart.


START
T5 guide curl check
OK
NG
a
T6 guide adjustment
T6,T7 guide curl check
OK
NG
T6 guide NG
T7 guide NG
T6.T7 guide NG
b
c
d
T7 guide adjustment
T7 guide adjustment
T7 guide adjustment
END

   a. This T6 guide's adjustment is carried out for tape curl at the T5 guide.
   b. This T7 guide's adjustment is carried out for tape curl at the T6 guide.
   c. This T7 guide's adjustment is carried out for tape curl at the T7 guide.
   d. This T7 guide's adjustment is carried out for tape curls at the T6 and T7 guides.

2) If the result is still NG even after repeating step 1) several times, remove the limitation flanges of the T6 and T7 guides and reverse them as shown in the Fig. 9-77 (b). Repeat step 1) again.
3) If the result is still NG even after repeating step 2), remove the T7 guide roller. After removing the T7 guide roller, install it in the upside-down direction or replace it with a new guide roller, Repeat step 1) again.
4) Repeat the check of step ㉝ again. If the result is OK, carry out step ㊳. If the result is NG, repeat from step ㉞ again.

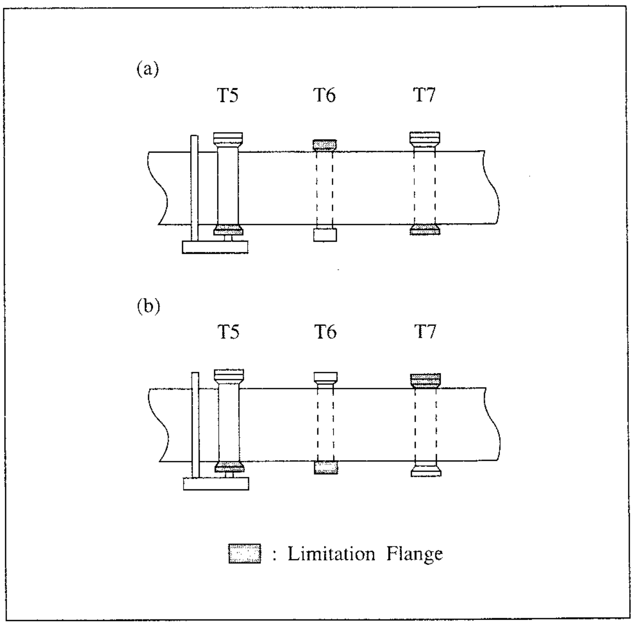

(a)
T5
T6
T7
(b)
T5
T6
T7
▨ : Limitation Flange

Fig. 9-77. Limitation Flange (T5, T6 and T7 Guide)

㊳ T7 Guide Recovery Check (±1)

Note: Be sure to perform recovery check in both PLAY (+1) and VAR (-1) modes.

Push upper portion and bottom of T7 guide roller from the opposite side of the tape contacting side with bamboo stick as shown in Fig. 9-78 and fold the tape, in other words runs the tape over the flange. In this case tape is folded at the lower flange. Then check that the tape is recovered from folding in 1 or 2 seconds after releasing bamboo stick. (Fig. 9-78)
T6 and T7 guides height adjustment is completed if recovery check is OK.

If the result of a recovery check is NG, repeat from the step ㉝. However, pay attention to the following. If the flange was reversed in the step ㊲, dismount the T7 guide roller and mount it in the upside-down direction or replace it with a new roller.
If the T7 guide roller was dismounted and mounted again in the upside-down direction in the step ㊲, replace the T7 guide roller with a new roller.

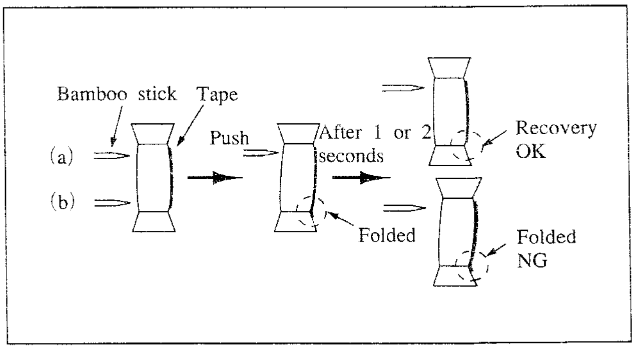
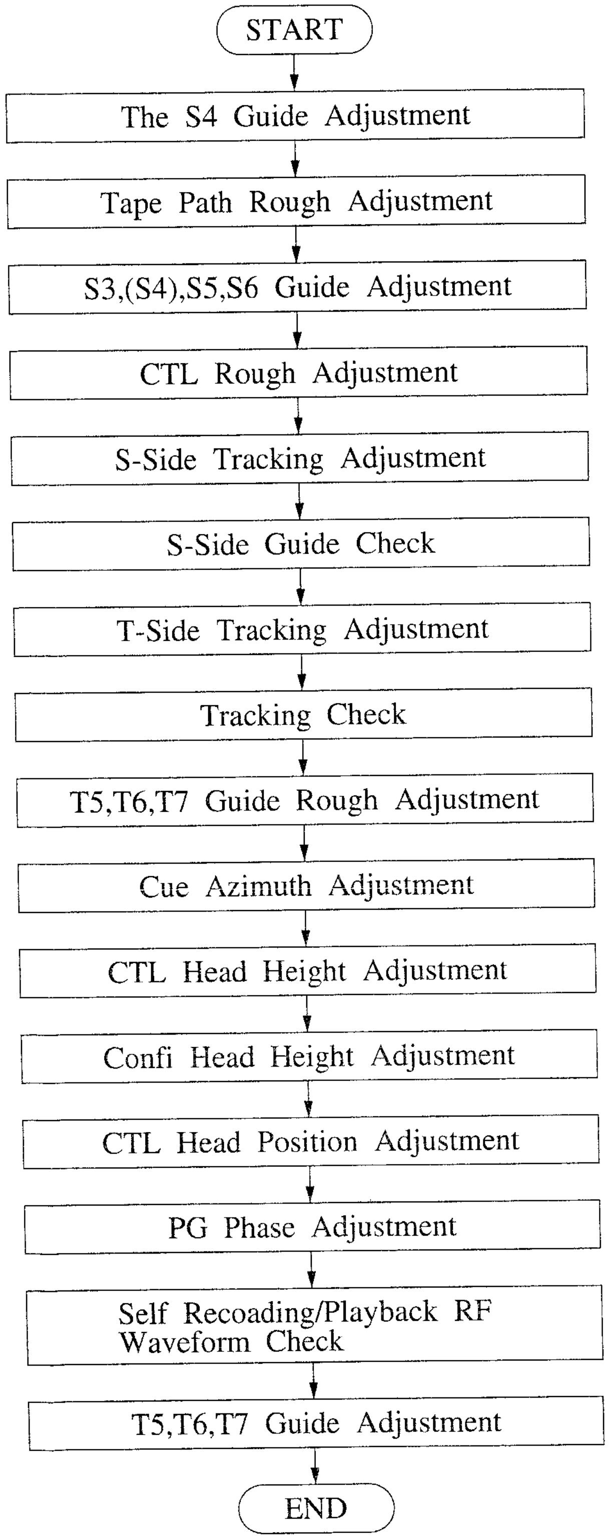

Bamboo stick
Tape
(a)
(b)
Push
After 1 or 2 seconds
Folded
Recovery OK
Folded NG

Fig. 9-78. Tape Recovery Check

APPENDIX 1. FLOWCHART FOR TAPE PATH ALIGNMENT


START
The S4 Guide Adjustment
Tape Path Rough Adjustment
S3,(S4),S5,S6 Guide Adjustment
CTL Rough Adjustment
S-Side Tracking Adjustment
S-Side Guide Check
T-Side Tracking Adjustment
Tracking Check
T5,T6,T7 Guide Rough Adjustment
Cue Azimuth Adjustment
CTL Head Height Adjustment
Confi Head Height Adjustment
CTL Head Position Adjustment
PG Phase Adjustment
Self Recoading/Playback RF Waveform Check
T5,T6,T7 Guide Adjustment
END

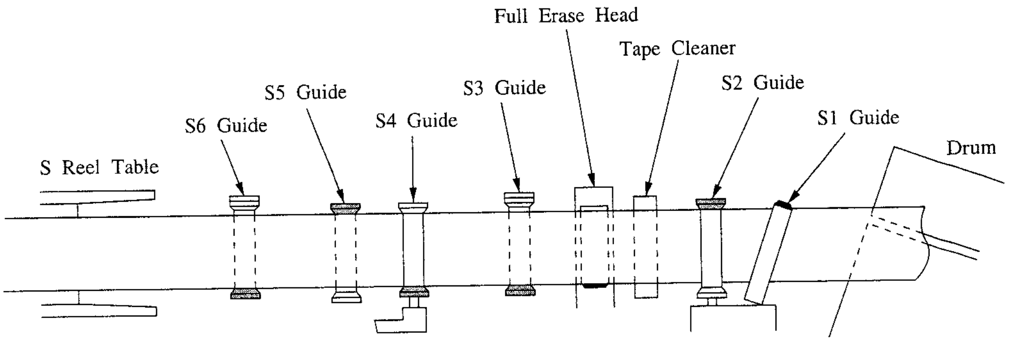
APPENDIX 2. TAPE PATH CHECK QUICK REFERENCE

As for quick reference of S1, S2, T1 and T2 guides, refer to Appendix 3.

GUIDE	CHECK		ADJUSTMENT
	MODE	Spec.	
S5/S6	PLAY VAR [–1]	*	Adjust the height of the S5 and S6 guides. **Do not turn the S6 guide by more than ±90° against the tool setting.** If the result is NG after repeating the adjustment several times, dismount the S6 guide roller and mount it in the upside-down direction or replace it with a new roller.
S4	PLAY	0	**Do not adjust this guide because it is the reference guide for tape path adjustment.** If you replace it or if you should change its height, check the height using a tool.
	VAR [–1]	*	
S3	PLAY	0	Adjust S3 guide so that the lower flange is in contact with the lower side of tape edge.
	VAR [–1]		
T3	PLAY	0	Adjust T3 guide so that the lower flange is in contact with the lower side of tape edge.
	VAR [–1]		
T5	PLAY	0	Turn T5 guide so that the lower flange is in contact with the lower side of tape edge.
	VAR [–1]	*	Turn T6 and T7 guides until curl and wrinkle on T5 guide disappear.
T6/T7	PLAY VAR [–1]	*	Adjust the height of T6 and T7 guides. If the result is NG after several repetitions, reverse the flanges controlling T6 and T7 guides. If the result is still NG, dismount S7 guide roller and mount it in the upside-down direction or replace it with a new roller.

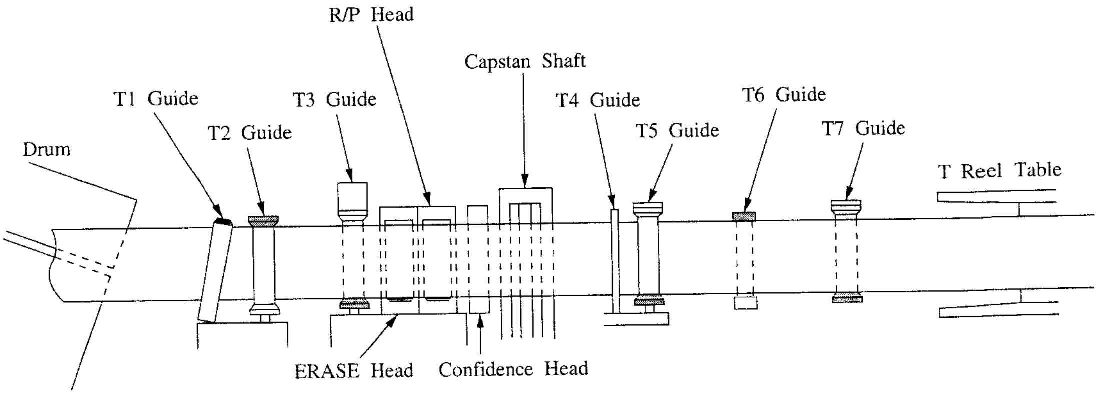
0 : The tape should not curl or wrinkle.
* : Be sure that no curls and wrinkles to damage the tape.

Note: Do not adjust the S4 guide height. It is a reference guide for the tape path adjustment.


Full Erase Head
Tape Cleaner
S5 Guide
S3 Guide
S2 Guide
S6 Guide
S4 Guide
S1 Guide
Drum
S Reel Table

S Side

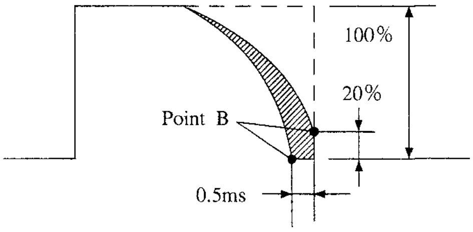
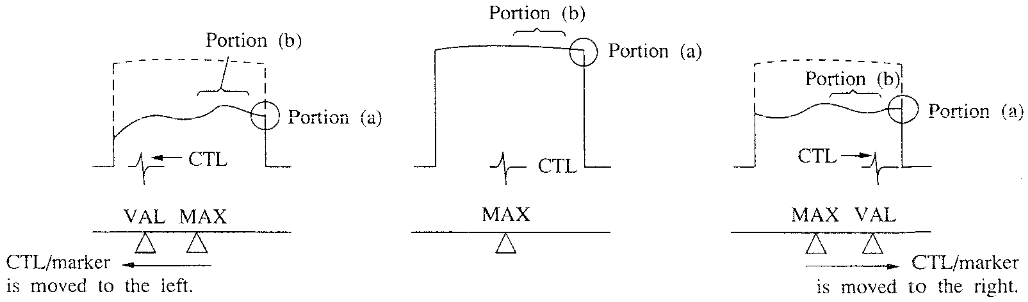
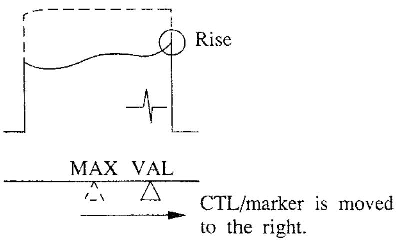
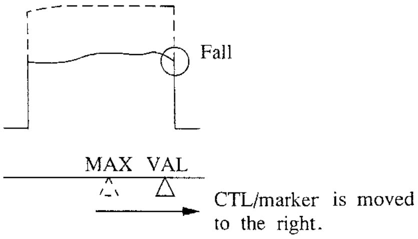
▨ : Limitation Flange

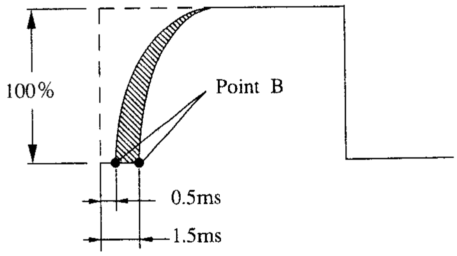
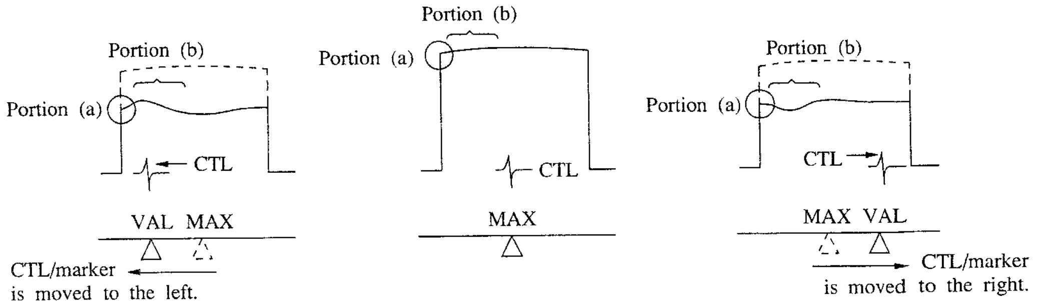
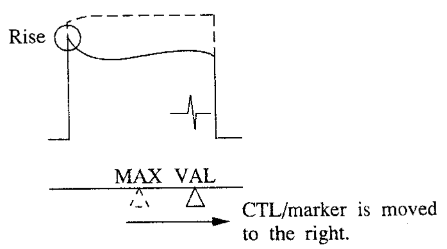
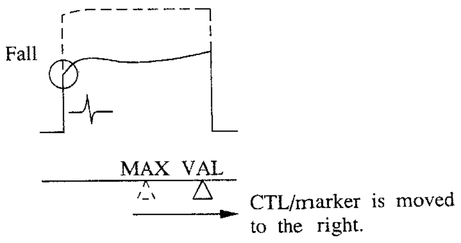

R/P Head
Capstan Shaft
T1 Guide
T3 Guide
T4 Guide
T6 Guide
T2 Guide
T5 Guide
T7 Guide
Drum
T Reel Table
ERASE Head
Confidence Head

T Side

▨ : Limitation Flange

APPENDIX 3. S1/S2/T1/T2 GUIDE ADJUSTMENT QUICK REFERENCE

GUIDE	ADJUSTMENT AND KEY POINT
S1	**Check Method: Play back the alignment tape (ER2-2, TC 0 to 15 min).** Raise S2 guide to the position where RF envelope does not change. At this time Point B should meet the specification. **Specification:** Point B should be in shaded ▨ area in Fig. A-1. **Adjustment:** Adjust the slantness of S1 guide.  100% 20% Point B 0.5ms **Fig. A-1. S1 Guide Slantness Check**
S2	**Check method: Play back the alignment tape (ER2-2, TC 0 to 15 min).** 1. Pay attention to portion (a) of RF envelope in Fig. A-2. 2. Change the setting of TRACKING to "VAR". The portion (a) should move as parallel as possible when control knob (tracking volume) on the control panel is turned clockwise. 3. As for portion (b) of RF envelope, the adjustment of S2 guide is unrelated. Therefore disregard here. **Adjustment:** Perform the following adjustment in case of the shape of RF envelope shown in Fig. A-3 or Fig. A-4. In the case of Fig. A-3, lower S2 guide. In the case of Fig. A-4, raise S2 guide.  Portion (b) Portion (a) CTL VAL MAX CTL/marker is moved to the left. Portion (b) Portion (a) CTL MAX Portion (b) Portion (a) CTL MAX VAL CTL/marker is moved to the right. ⓐ Turn the control knob (tracking volume) counterclockwise. ⓑ Make RF envelope maximum. ⓒ Turn the control knob (tracking volume) clockwise. **Fig. A-2. S2 Guide Height Check**  Rise MAX VAL CTL/marker is moved to the right. (Turn the control knob (tracking volume) clockwise) **Fig. A-3. S2 Guide is too high.**  Fall MAX VAL CTL/marker is moved to the right. (Turn the control knob (tracking volume) clockwise) **Fig. A-4. S2 Guide is too low.**

GUIDE	ADJUSTMENT AND KEY POINT
T1	**Check Method: Play back the alignment tape (ER2-2, TC 0 to 15 min)** Raise T2 guide to the position where RF envelope does not change any more. At this time Point B should meet the specification. **Specification:** Point B should be in shaded ▨ area in a Fig. A-5. **Adjustment:** Adjust the slantness of T1 guide.  100% Point B 0.5ms 1.5ms **Fig. A-5. T1 Guide Slantness Check**
T2	**Check method: Play back the alignment tape (ER2-2, TC 0 to 15 min)** 1. Pay attention to portion (a) of RF envelope in Fig. A-6. 2. Change the setting of TRACKING to "VAR". The portion (a) should move as parallel as possible when control knob (tracking volume) on the control panel is turned clockwise or counterclockwise. 3. As for portion (b) of RF envelope, the adjustment of T2 guide is unrelated. Therefore disregard here. **Adjustment:** Perform the following adjustment in case of the shape of RF envelope shown in Fig. A-7 or Fig. A-8. In the case of Fig. A-7, lower T2 guide. In the case of Fig. A-8, raise T2 guide.  Portion (b) Portion (a) CTL VAL MAX CTL/marker is moved to the left. Portion (b) Portion (a) CTL MAX Portion (b) Portion (a) CTL MAX VAL CTL/marker is moved to the right. ⓐ Turn the control knob (tracking volume) counterclockwise. ⓑ Make RF envelope maximum. ⓒ Turn the control knob (tracking volume) clockwise. **Fig. A-6. T2 Guide Height Check**  Rise MAX VAL CTL/marker is moved to the right. (Turn the control knob (tracking volume) clockwise) **Fig. A-7. T2 guide is too high.**  Fall MAX VAL CTL/marker is moved to the right. (Turn the control knob (tracking volume) clockwise) **Fig. A-8. T2 guide is too low.**

APPENDIX 4. SIMPLIFIED CHECK FOR TRACKING

This check is to confirm the tracking easily. Use this for quick tracking check.
In order to check the tracking more correctly, perform the tracking check shown in the main chapter.

Check Procedure

BKDV-101

1. Obtain the signals from the REC board as below.
   (1) Connect a probe (oscilloscope) to TP101 (REC CH-A OUT) on the REC board.
   (2) Connect the GND pin of an oscilloscope to the shielding case on the REC board.
   (3) Connect the CF PULSE OUT pin (BNC connector) on the connector panel as a trigger input.
2. Press the keys on the control panel in the order below.
   VIDEO OUT, F11
   Change the setting of CF PULSE to "OUT FRM".
3. Install an alignment tape (ER2-2) and play back the TC 15 to 20 min on the alignment tape.
4. Press the keys on the control panel in the following sequence.
   TEST, F5 (RF), F4
   Change the setting of TRACKING to "VAR".
5. Turn the adjustment control on the control panel and adjust so that the playback RF amplitude is maximum.
6. Confirm that the RF waveform satisfies the specification in the Fig. A-10. If not, perform the tracking adjustment.
7. Press the F4 key to return to the "FIX' display.

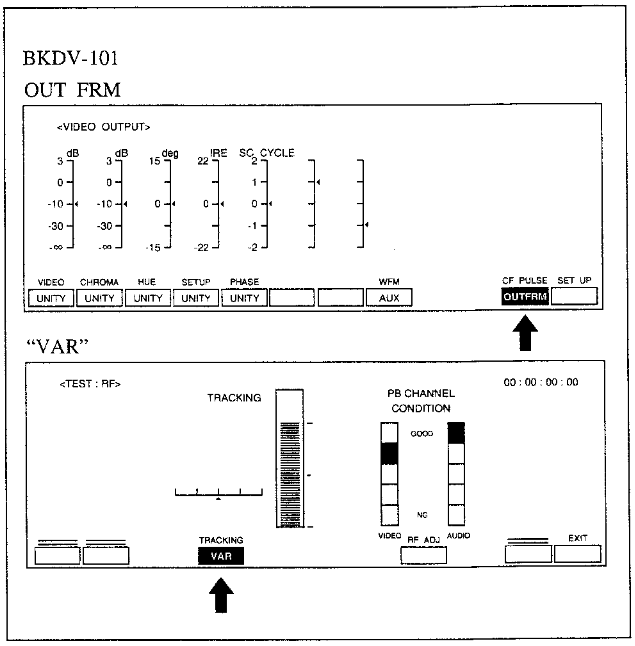
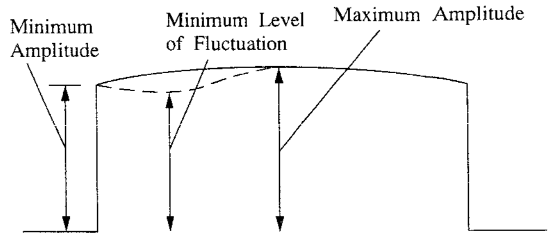

BKDV-101
OUT FRM
<VIDEO OUTPUT>
dB
dB
deg
IRE
SC CYCLE
VIDEO
CHROMA
HUE
SETUP
PHASE
WFM
CF PULSE
SET UP
UNITY
UNITY
UNITY
UNITY
UNITY
AUX
OUTFRM
"VAR"
<TEST : RF>
TRACKING
PB CHANNEL CONDITION
GOOD
NG
00 : 00 : 00 : 00
TRACKING
VAR
VIDEO
RF ADJ
AUDIO
EXIT

Fig. A-9. EL Panel Display (BKDV-101)


Minimum Amplitude
Minimum Level of Fluctuation
Maximum Amplitude

Specification :

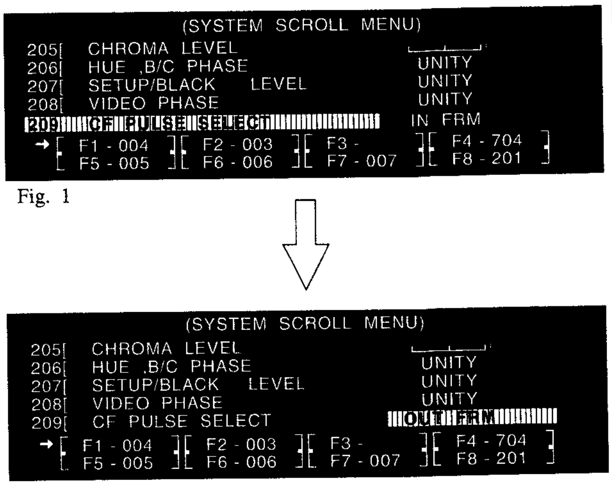
$$\frac{\text{Minimum amplitude or minimum level of fluctuation, which is ever smaller}}{\text{Maximum amplitude}} \times 100 \geqq 80\%$$

Fig. A-10. Tracking Check

BKDV-200 series

1. Obtain the signals from the REC board as below.
   (1) Connect a probe (oscilloscope) to TP101 (REC CH-A OUT) on the REC board.
   (2) Connect the GND pin of an oscilloscope to the shielding case on the REC board.
   (3) Connect the CF PULSE OUT pin (BNC connector) on the connector panel as a trigger input.
2. Press the keys on the control panel in the order below.
   (1) Press SHIFT + SET UP.
   (2) Turn the search dial or press ∨ key to select 209. [CF PULSE SELECT].
   (Fig. A-11, Fig. 1)
   (3) Press > key to move the cursor to the right, and select "OUT FRM" by pressing ∧ key.
   (Fig. A-11, Fig. 2)
3. Install an alignment tape (ER2-2) and play back the TC 15 to 20 min on the alignment tape.
4. Set "VTR" mode by pulling the control knob.
5. Adjust the playback RF amplitude by turning the control knob so that it resets at the maximum value.
6. Confirm that the RF waveform satisfies the specification in Fig. A-10. If not, make a tracking adjustment.
7. Push the control knob to end the "VAR" mode.

BKDV-200 Series



```
                (SYSTEM SCROLL MENU)
205[  CHROMA LEVEL
206[  HUE ,B/C PHASE                    UNITY
207[  SETUP/BLACK    LEVEL              UNITY
208[  VIDEO PHASE                       UNITY
209[  CF PULSE SELECT                   IN FRM
 →[ F1 - 004 ][ F2 - 003 ][ F3 -       ][ F4 - 704 ]
  [ F5 - 005 ][ F6 - 006 ][ F7 - 007   ][ F8 - 201 ]
```

Fig. 1

```
                (SYSTEM SCROLL MENU)
205[  CHROMA LEVEL
206[  HUE ,B/C PHASE                    UNITY
207[  SETUP/BLACK    LEVEL              UNITY
208[  VIDEO PHASE                       UNITY
209[  CF PULSE SELECT                   OUT FRM
 →[ F1 - 004 ][ F2 - 003 ][ F3 -       ][ F4 - 704 ]
  [ F5 - 005 ][ F6 - 006 ][ F7 - 007   ][ F8 - 201 ]
```

Fig. 2

Fig. A-11. FL Panel Display (BKDV-200/201)

APPENDIX 5. HOW TO USE CLEANING CASSETTE TAPE AND HEAD CLOGGING CHECK METHOD AND MEASURE

- Cleaning cassette tape (DCS-12CL or DCM-12CL)

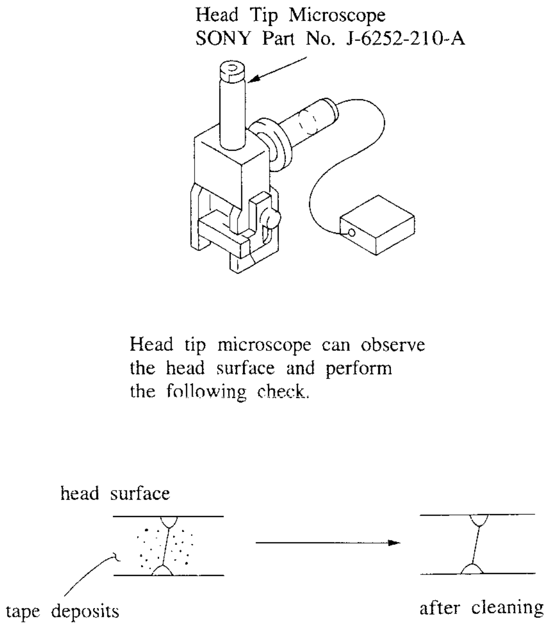
1. The cleaning cassette tape is used for removing the clog of the Rotary Head, and for repairing the delicate shape deformation on the surface of the Rotary Head. The cleaning cassette tape is used for periodical cleaning (once of a week), too.
2. It is no possibility of the Rotary Head is polished because of the cleaning cassette tape is low the efficacy of polish except DCS-7CL. But a cleaning finishes within five seconds into the PLAY mode. Do not play back the mode except the PLAY mode.
3. The cleaning cassette tape can be used only once. Do not rewind it for reuse.
4. About the details of how to use the cleaning cassette tape
   (1) Press the PLAY button just after injecting the cleaning cassette tape.
   (2) Be sure to press the EJECT button after playing back the cleaning cassette tape within five seconds. (If pressing the STOP button, the tape continues to touch onto the Rotary Head.)
   (3) Eject the cleaning cassette tape.

Head tip microscope (Fig. A-11-2)

Use a head tip microscope to confirm that the head cleaning is performed completely.

Cleaning Cassette Tape
DCS-12CL or DCM-12CL

Fig. A-11-1. Cleaning cassette tape



Head tip microscope can observe the head surface and perform the following check.

Fig. A-11-2. Head tip microscope

*1 HEAD CLOGGING CHECK METHOD AND MEASURE

Perform self recording/playback and check the channel condition and RF envelope level of each channel (4 channels).
If any one level of them is extremely low as shown in Fig. A-12 or if any one channel of them is around 4, clog might have occurred.
(About the Channel Condition Check and RF Envelope Waveform Check, refer to *2 and *3 on the later page.)

In this case, clean the head surface using a cleaning cloth moistened with alcohol, then wipe it with dry cloth as described in the manual. And play back the cleaning cassette tape within five seconds into PLAY mode. In emergency, however, the cleaning cassette is recommended.
If these levels do not recover to the normal condition at all after cleaning or using the cleaning tape, observe the head surface with the headtip microscope as shown in Fig. A-13.
If the head surface is still stained with magnetic particles, (or no headtip microscope is available), clean the head surface again the above procedures.

If the head surface is not stained, check that the head projection is 30 µm or more using a eccentricity adjustment tool (refer to Section 5. Head Projection Check in maintenance manual.)
If the head projection is less than 30 µm, replace the drum.

If within the range, there may be some troubles in the RF system. Check the trouble of the RF adjustment with reference to "RF Signal System Adjustment" in the manual. Also check the connectors (CN451 to CN454, CN461 to CN464 and CN481 to CN484) from drum, the open harness on DR-132 board, the defective soldering (W1 to W4), and the defective of REC-11 or EQ-29 board.

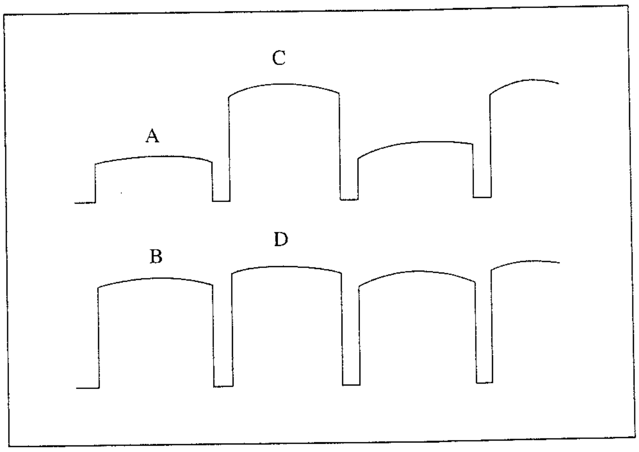


Fig. A-12. CH-A Clog Condition

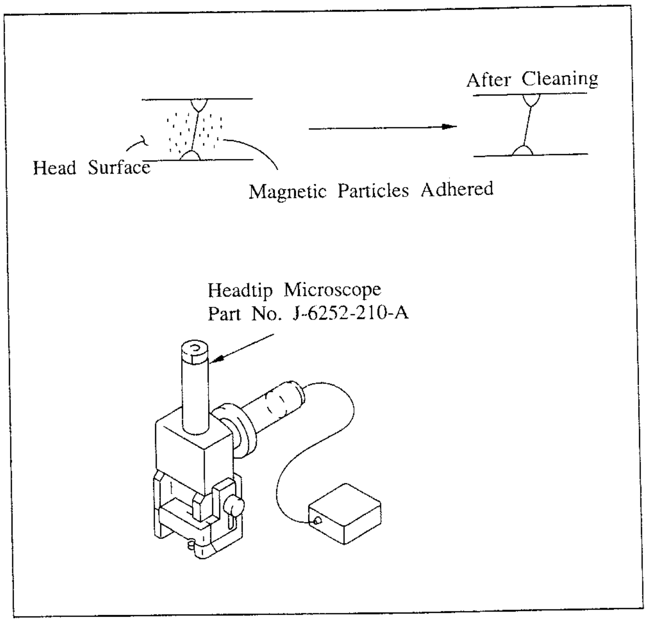


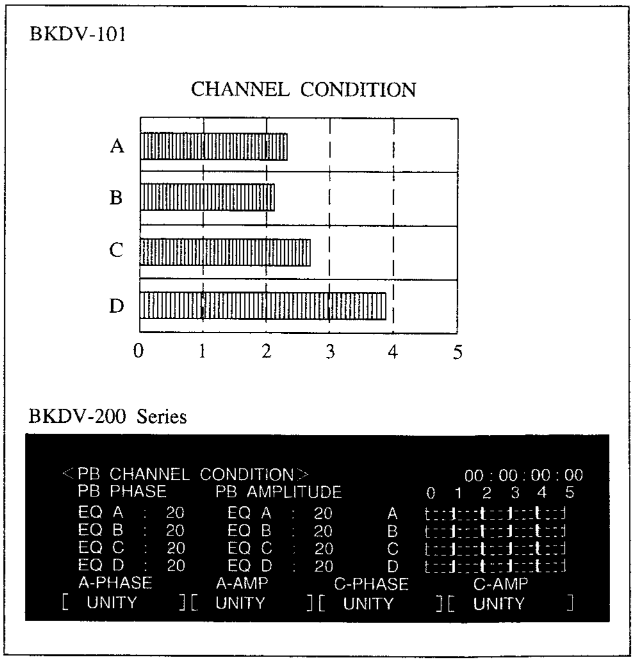
Fig. A-13. Head Cleaning

*2 CHANNEL CONDITION CHECK METHOD

Press keys on the control panel in the order as shown below. (The error condition can be checked.)

BKDV-101 : [TEST], [F5] (RF), [F3] (RF ADJ)
BKDV-200 series :

1) [SHIFT] + [SET UP]
2) [ENTRY] + center key + search dial (or [∨] key) to enter the <TEST> menu.
   Select 815. [RF PB ADJUST] by pressing the [∨] key or by turning the search dial.
3) Press the [>] key to move the cursor to EXECUTE.
   Then, press the [∧] key to enter the mode.



```
<PB CHANNEL CONDITION>                        00 : 00 : 00 : 00
 PB PHASE          PB AMPLITUDE               0  1  2  3  4  5
 EQ A  :  20        EQ A  :  20          A
 EQ B  :  20        EQ B  :  20          B
 EQ C  :  20        EQ C  :  20          C
 EQ D  :  20        EQ D  :  20          D
 A-PHASE           A-AMP          C-PHASE          C-AMP
[ UNITY         ][ UNITY        ][ UNITY        ][ UNITY        ]
```

Fig. A-14. Channel Condition Check

*3 RF ENVELOPE WAVEFORM CHECK METHOD

1) Connect the oscilloscope to the WFM OUT on the connector panel using the cable with BNC connectors.
2) Connect the CF PULSE OUT to the oscilloscope as a trigger input through the cable with BNC connectors. TP72 on SP-15 board (DVR-20/C20/20P) or SSP-07 board (DVR-28/28P) can be used as trigger input.
3) Press the keys on the control panel in the following sequence to change the setting of CF PULSE to " OUT FRM".

   BKDV-101 : Press the [VIDEO OUT] key. Then, press the [F11] key to select "OUT FRM".

   BKDV-200 series :

   Press the [SHIFT] + [SET UP] key.
   Select 209. [CF PULSE SELECT] by turning the search dial. Press the [>] key to move the cursor to the right. Press the [∧] key to select "OUT FRM".
4) Press keys on the control panel in the following sequence.

   BKDV-101: Press [VIDEO OUT] key then [F7] key to change the setting of WFM to "ENV A/C". At this time, the envelope of CH-A and CH-C can be checked. Similarly, the envelope of CH-B and CH-D can be checked by setting of WFM to "ENV B/D".

   BKDV-200 series:

   The envelopes of Ach and Cch can be checked by pressing the [A/C] key of the monitor select key.
   The envelopes of Bch and Dch can be checked by pressing the [B/D] key.

APPENDIX 6. S AND T REEL TABLES HEIGHT ADJUSTMENT

This adjustment is not necessary in usual tape path adjustment. If tape heavily touches the reel flange, adjust the reel table height referring to "Reel Motor Replacement" in Maintenance Manual Vol-1.

However, if the tape touches the flange even after height adjustment, go to the following adjustment.

Adjustment

1. Loosen the setscrews A and B using a hexagon wrench (Across flats of 2.0 mm).
2. While pushing the reel table lightly in the direction of the arrow shown in the figure, adjust the height by turning the setscrew C using a hexagon wrench (Across flats of 1.5 mm) so that the tape runs without contacting the flange surface.
3. Tighten the setscrews A and B.
   Tightening Torque : 58.8×10^{-2} N·m (6 kgf·cm)

Note: If the tape touches the reel flange even after this adjustment, check the followings.

(1) Whether or not one of the reel flanges of the tape cassette is deformed abnormally.

(2) Whether or not the sheet of the reel table is deformed or whether some foreign material is stuck to it.

(3) Whether or not an unusual noise is generated by the reel motor.

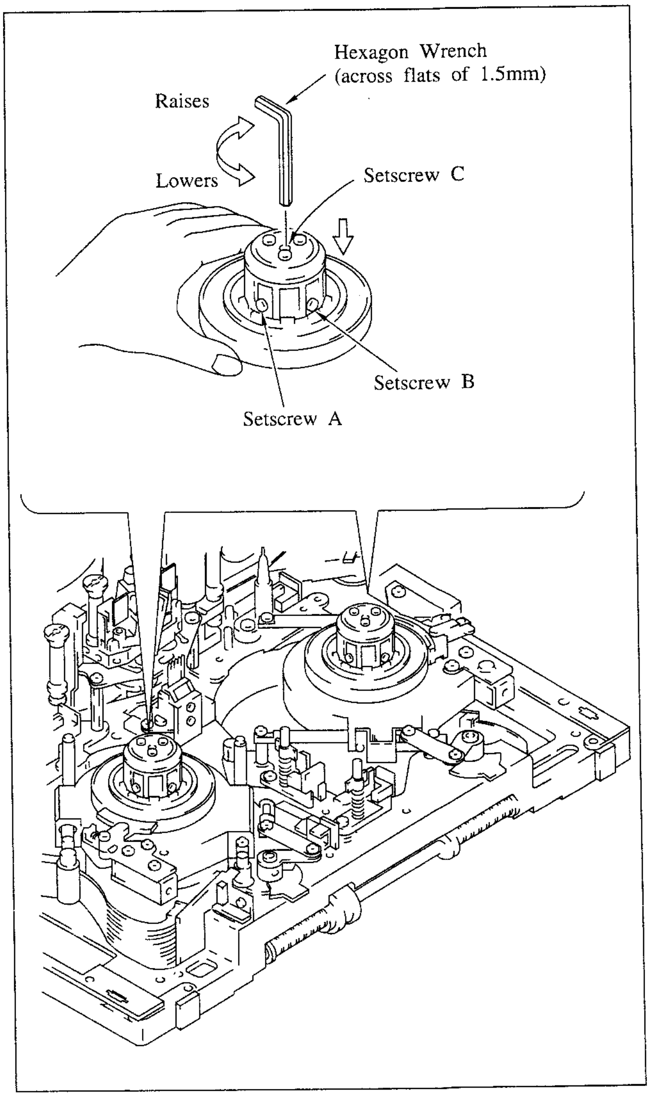


Fig. A-15. S/T Reel Table Height Adjustment

APPENDIX 7. MONITOR SELECT KEY OPERATION

A monitor select key of BKDV-200 series control panel is used for input the command, data and so on, in CHECKER mode of TEST menu.
For the key operation, this is shown as follows in this manual.

ex.) Entry F28 in CHECKER Mode.

BKDV-200/201/202 : sheet plane display of the monitor select key
For BKDV-200/201, both the standard and
supplied accessories are applicable.

INPUT CHECK + 5 (F) , 2 , 8 , SET

input alphabet

Equal to ALPHA SET key
(For BKDV-202, LOCAL/REMOTE)

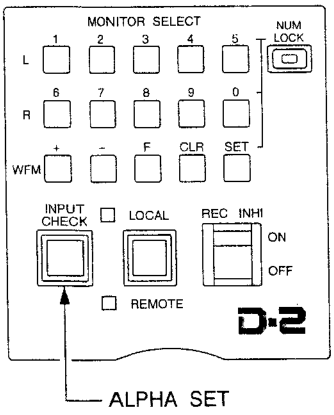
The numeric character and its corresponding alphabetic character are shown in the table below.

Numeral ↔ alphabet to correspondence chart

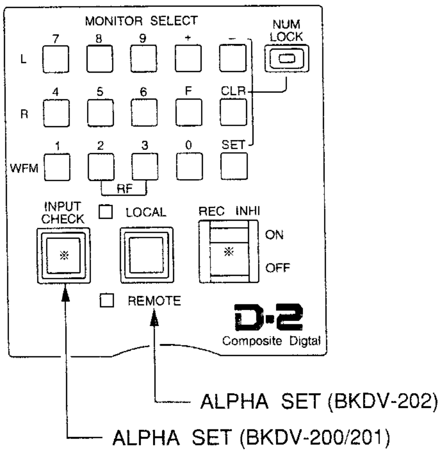
1	2	3	4	5	6	7	8	9	0
B	C	D	E	F					A

SET : Used when entering a command or data.
+ : Used as a space key.(Advances to the next address for $ and $$ commands.)
− : Delete one character before the cursor. (Return to the previous address for $ and $$ commands.)
CLR : Not operate.

Monitor Select Key Sheet

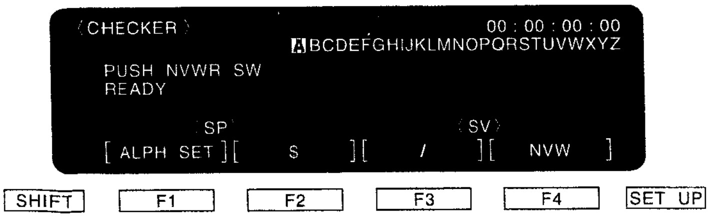

MONITOR SELECT
NUM LOCK
1 2 3 4 5
L
6 7 8 9 0
R
+ − F CLR SET
WFM
INPUT CHECK
LOCAL
REC INHI
ON
OFF
REMOTE
D-2
ALPHA SET

BKDV-200/201 standard


MONITOR SELECT
NUM LOCK
7 8 9 + −
L
4 5 6 F CLR
R
1 2 3 0 SET
WFM
RF
INPUT CHECK
LOCAL
REC INHI
ON
OFF
REMOTE
D-2
Composite Digtal
ALPHA SET (BKDV-202)
ALPHA SET (BKDV-200/201)

BKDV-200/201 supplied accessories
BKDV-202 (not have ※-mark key)

Note: The alphabet can be input using the second-line alphabets on the display.
ex.) To select "A"...............Select A using the search dial, and press F1 key.



```
⟨CHECKER⟩                          00 : 00 : 00 : 00
                         ABCDEFGHIJKLMNOPQRSTUVWXYZ
   PUSH  NVWR  SW
   READY
              ⟨SP⟩                        ⟨SV⟩
   [ ALPH  SET ][    $    ][    /    ][   NVW    ]
```

SHIFT
F1
F2
F3
F4
SET UP

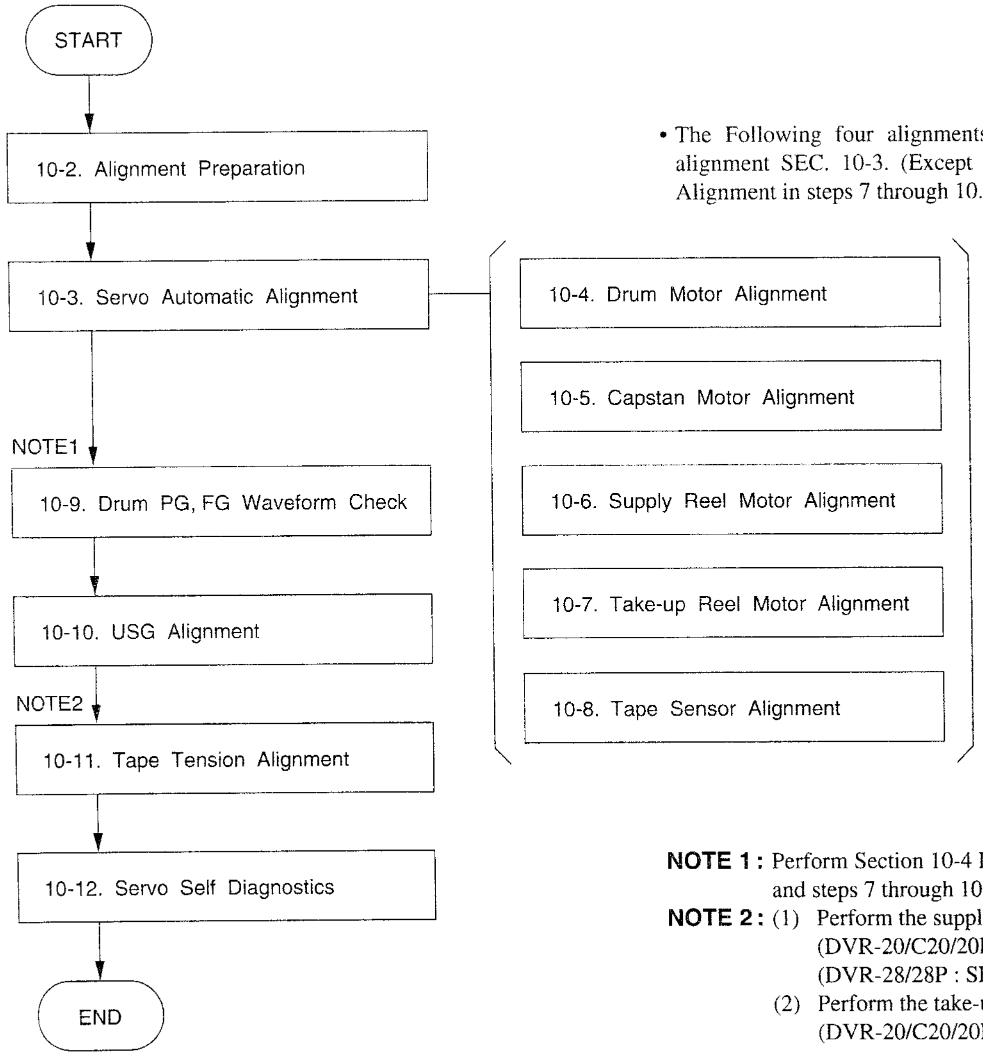
SECTION 10
SERVO SYSTEM ALIGNMENT

10-1. ALIGNMENT SEQUENCE

When replacing the motor, refer to Section 6 Part Replacement and perform the following alignments of each motor.

Drum Motor : Drum Ass'y Replacement
(DVR-28/28P : SEC. 6-2 DVR-20/C20/20P/C20P : SEC. 6-5) → SEC. 10-4
Reel Motor : Reel Motor Replacement
(DVR-28/28P : SEC. 6-7-3) → SEC. 10-6 and 10-7
Reel Motor Ass'y Component Replacement
(DVR-20/C20/20P/C20P : SEC. 6-8-1) → SEC. 10-6 and 10-7
Capstan Motor : Capstan Motor Replacement
(DVR-28/28P : SEC. 6-27 DVR-20/C20 : SEC. 6-28) → SEC. 10-5

- Perform Section 10-8 Tape Sensor Alignment When replacing PC-63 and PC-65 boards.
- Perform Section 10-10 USG (Ultrasonic guide) Alignment When replacing UC-2 board.
- Servo system alignment


START
10-2. Alignment Preparation
10-3. Servo Automatic Alignment
NOTE1
10-9. Drum PG, FG Waveform Check
10-10. USG Alignment
NOTE2
10-11. Tape Tension Alignment
10-12. Servo Self Diagnostics
END
10-4. Drum Motor Alignment
10-5. Capstan Motor Alignment
10-6. Supply Reel Motor Alignment
10-7. Take-up Reel Motor Alignment
10-8. Tape Sensor Alignment

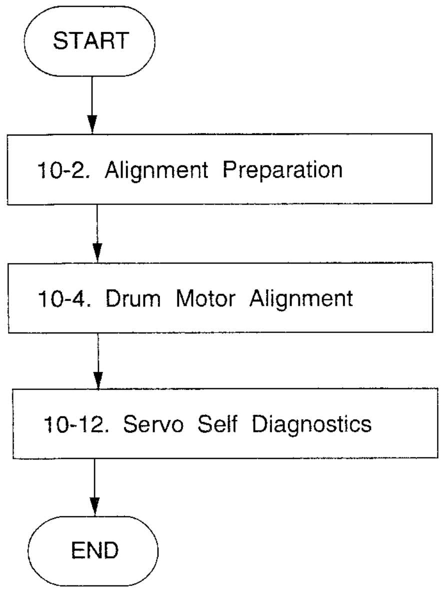
- The Following four alignments can be performed as single alignment SEC. 10-3. (Except for Section 10-4 Drum Motor Alignment in steps 7 through 10.)

NOTE 1 : Perform Section 10-4 Drum Motor Alignment in step 1 and steps 7 through 10.

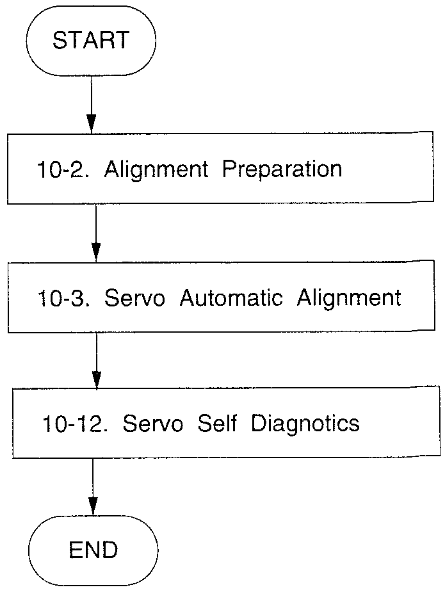
NOTE 2 : (1) Perform the supply side tape tension alignment.
(DVR-20/C20/20P/C20P : SEC. 6-10-3)
(DVR-28/28P : SEC. 6-9-3)
(2) Perform the take-up side tape tension alignment.
(DVR-20/C20/20P/C20P : SEC. 6-12-4)
(DVR-28/28P : SEC. 6-11-4)

- Perform the following alignments When replacing MD-50, SP-15, SV-133 boards (For DVR-20/C20/20P/C20P), MD-62 and SSP-07 boards (For DVR-28/28P)

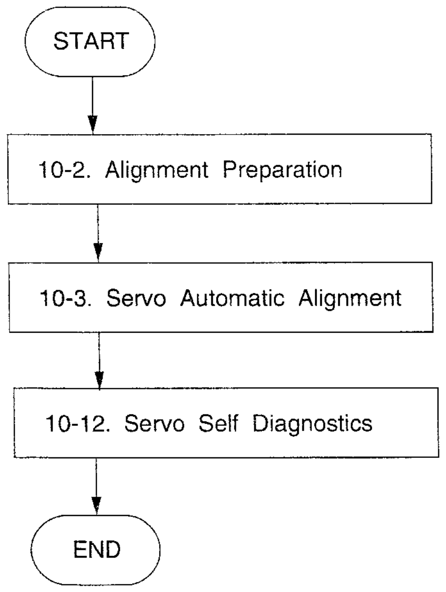
- Alignment procedure when replacing SP-15 board
(DVR-20/C20/20P/C20P)

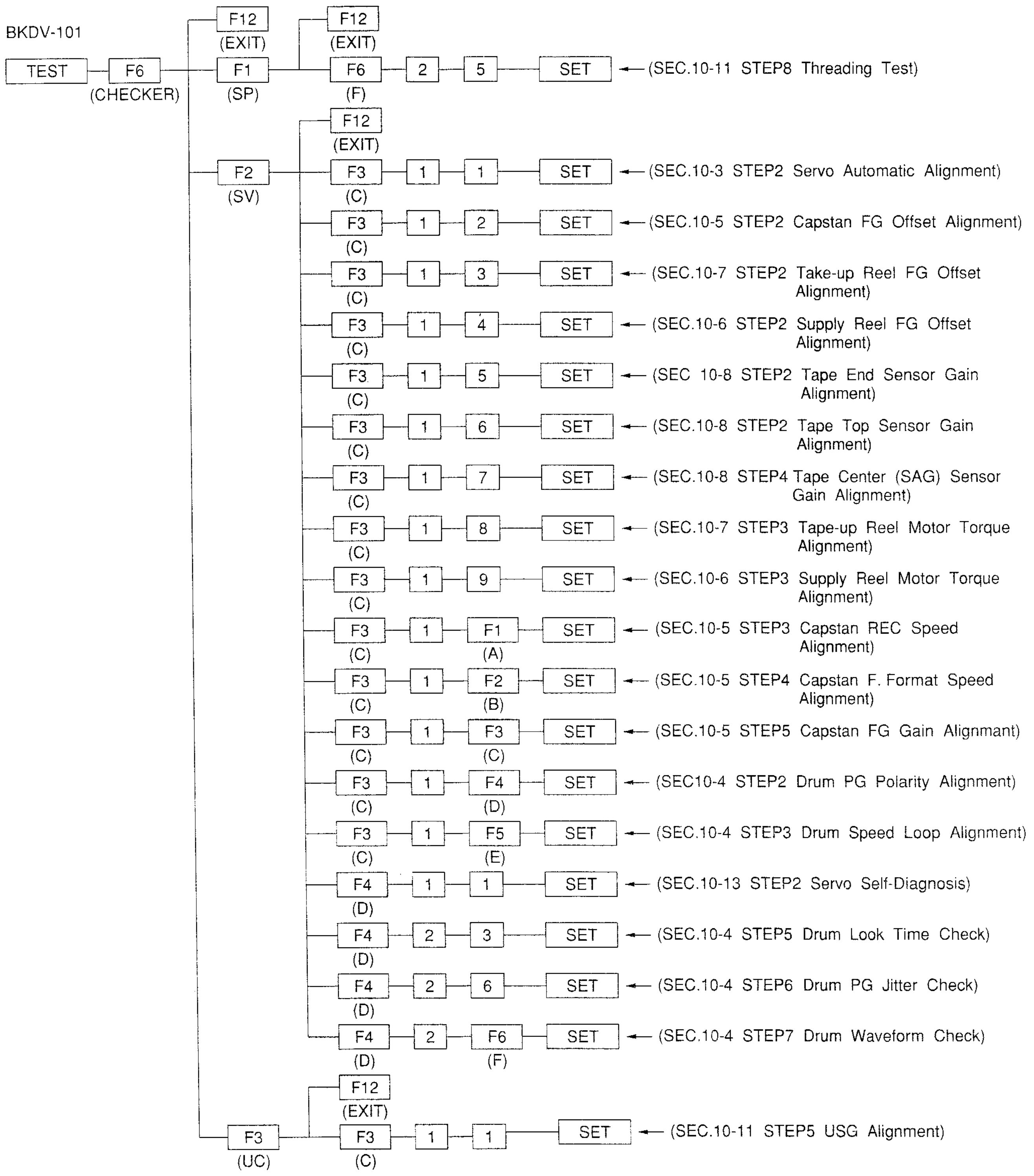

START
10-2. Alignment Preparation
10-4. Drum Motor Alignment
10-12. Servo Self Diagnostics
END

- Alignment procedure when replacing SV-133 and MD-50 boards.
(DVR-20/C20/20P/C20P)


START
10-2. Alignment Preparation
10-3. Servo Automatic Alignment
10-12. Servo Self Diagnotics
END

- Alignment procedure when replacing SSP-07 and MD-62 boards.
(DVR-28/28P)


START
10-2. Alignment Preparation
10-3. Servo Automatic Alignment
10-12. Servo Self Diagnostics
END


BKDV-101
TEST — F6 (CHECKER) — F12 (EXIT)
F1 (SP) — F12 (EXIT)
F6 (F) — 2 — 5 — SET ←(SEC.10-11 STEP8 Threading Test)
F2 (SV) — F12 (EXIT)
F3 (C) — 1 — 1 — SET ←(SEC.10-3 STEP2 Servo Automatic Alignment)
F3 (C) — 1 — 2 — SET ←(SEC.10-5 STEP2 Capstan FG Offset Alignment)
F3 (C) — 1 — 3 — SET ←(SEC.10-7 STEP2 Take-up Reel FG Offset Alignment)
F3 (C) — 1 — 4 — SET ←(SEC.10-6 STEP2 Supply Reel FG Offset Alignment)
F3 (C) — 1 — 5 — SET ←(SEC 10-8 STEP2 Tape End Sensor Gain Alignment)
F3 (C) — 1 — 6 — SET ←(SEC.10-8 STEP2 Tape Top Sensor Gain Alignment)
F3 (C) — 1 — 7 — SET ←(SEC.10-8 STEP4 Tape Center (SAG) Sensor Gain Alignment)
F3 (C) — 1 — 8 — SET ←(SEC.10-7 STEP3 Tape-up Reel Motor Torque Alignment)
F3 (C) — 1 — 9 — SET ←(SEC.10-6 STEP3 Supply Reel Motor Torque Alignment)
F3 (C) — 1 — F1 (A) — SET ←(SEC.10-5 STEP3 Capstan REC Speed Alignment)
F3 (C) — 1 — F2 (B) — SET ←(SEC.10-5 STEP4 Capstan F. Format Speed Alignment)
F3 (C) — 1 — F3 (C) — SET ←(SEC.10-5 STEP5 Capstan FG Gain Alignmant)
F3 (C) — 1 — F4 (D) — SET ←(SEC10-4 STEP2 Drum PG Polarity Alignment)
F3 (C) — 1 — F5 (E) — SET ←(SEC.10-4 STEP3 Drum Speed Loop Alignment)
F4 (D) — 1 — 1 — SET ←(SEC.10-13 STEP2 Servo Self-Diagnosis)
F4 (D) — 2 — 3 — SET ←(SEC.10-4 STEP5 Drum Look Time Check)
F4 (D) — 2 — 6 — SET ←(SEC.10-4 STEP6 Drum PG Jitter Check)
F4 (D) — 2 — F6 (F) — SET ←(SEC.10-4 STEP7 Drum Waveform Check)
F3 (UC) — F12 (EXIT)
F3 (C) — 1 — 1 — SET ←(SEC.10-11 STEP5 USG Alignment)

Press F12 (EXIT) Key.

The screen returns to the preceding menu.

[Writing in NOVRAM]

BKDV-101

(1) Press the keys in the following sequence on the control panel.
① TEST , F6 (CHECKER) , F1 (SP)
② F10 (NVW) , SET

NOTE : Perform after ② in Step (1) above if the SP checker mode is selected.

(2) Whenever pressing / key, the following addresses are displayed.
Refer to each section for the addresses to be changed. If addresses other than the above are displayed, turn off the power and perform alignments again.

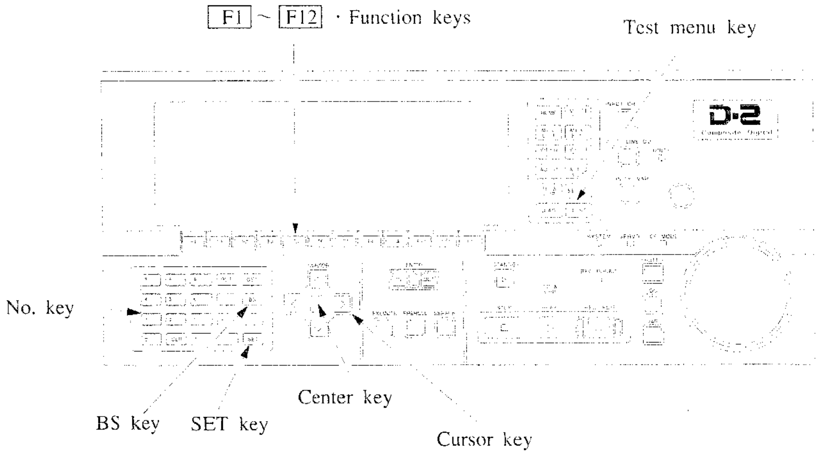
(3) Press / key after checking the addresses on the control panel.
"PUSH NVWR SW" is displayed. Press S71 (NOVRAM WRITE Switch) on SP-15 (DVR-20/C20/20P/C20P) and SSP-07 (DVR-28/28P) boards.
Check that "READY" is appeared on the control panel, The NOVRAM data is renewed.

(4) Press the keys in the following sequence.
F8 (=), 0 , SET
Return to the home menu.

[Control panel keys]

BKDV-101 and BKDV-200/201 have different control panel operation.
The alphanumeric character in paren thess indicates the menu number to be selected.
Example : (D), (2), (F), and (SET).
For the operation,refer to the description below.

BKDV-101


F1 ~ F12 · Function keys
Test menu key
D-2
No. key
Center key
BS key
SET key
Cursor key

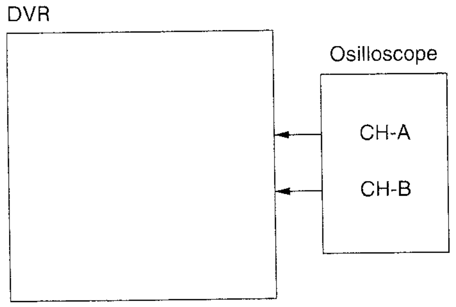
F1 — F12 : Function keys
< + □, > + □ : Press the center key and cursor key at the same time.
In this case, release the cursor key, then the center key.
BS Key : Press this key when the key is pressed erroneously.

10-2. ALIGNMENT PREPARATION

[Equipment]

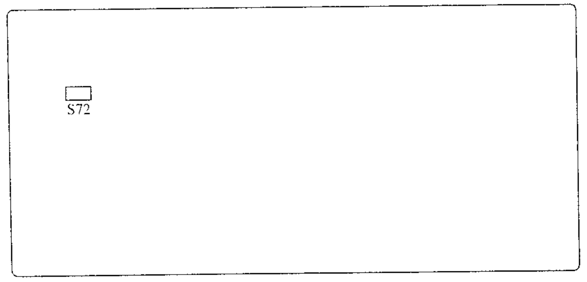
- Osilloscope (Equipment product : 2445 or 2465/Tektronix)

[Connection]



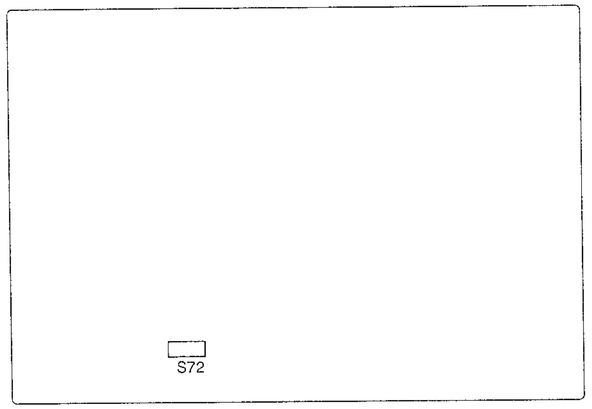
[Location]

SP-15 board (DVR-20/C20/20P/C20P)



A SIDE

SSP-07 board (DVR-28/28P)



A SIDE

[Switch/Jumper Initial Settings]

SP-15/SSP-07 boards

S72-1, 2, 3, 4 ················ OFF

[Error Message]

- The error message below is displayed when abnormality is detected during aligment.

ERROR!!XXXXXXXXXX

For the contents of the error message, refer to Section 3-6-8 Counter measures for Error Messages.

BKDV-200/201

SET UP — TEST — 807 CHECKER MODE EXECUTE

SHIFT — F3 (Board)

SP	F25	AUX	← (SEC.10-11 STEP8 Threading Test)
SV	C11	AUX	← (SEC.10-3 STEP2 Servo Automatic Alignment)
	C12	AUX	← (SEC.10-5 STEP2 Capstan FG Offset Alignment)
	C13	AUX	← (SEC.10-7 STEP2 Take-up Reel FG Offset Alignment)
	C14	AUX	← (SEC.10-6 STEP2 Supply Reel FG Offset Alignment)
	C15	AUX	← (SEC.10-8 STEP2 Tape End Sensor Gain Alignment)
	C16	AUX	← (SEC.10-8 STEP3 Tape Top Sensor Gain Alignment)
	C17	AUX	← (SEC.10-8 STEP4 Tape Center (SAG) Sensor Gain Alignment)
	C18	AUX	← (SEC.10-7 STEP3 Take-up Reel Motor Torque Alignment)
	C19	AUX	← (SEC.10-6 STEP3 Supply Reel Motor Torque Alignment)
	C1A	AUX	← (SEC.10-5 STEP3 Capstan REC Speed Alignment)
	C1B	AUX	← (SEC.10-5 STEP4 Capstan F. Format Speed Alignment)
	C1C	AUX	← (SEC.10-5 STEP5 Capstan FG Gain Alignment)
	C1D	AUX	← (SEC.10-4 STEP2 Durm PG Polarity Alignment)
	C1E	AUX	← (SEC.10-4 STEP3 Durm Speed Loop Alignment)
	D11	AUX	← (SEC.10-13 STEP2 Servo Self-Diagnosis)
	D23	AUX	← (SEC.10-4 STEP5 Durm Lock Time Check)
	D26	AUX	← (SEC.10-4 STEP6 Drum PG Jitter Check)
	D2F	AUX	← (SEC.10-4 STEP7 Drum Waveform Check)
UC	C11	AUX	← (SEC.10-11 STEP5 USG Aligument)

[Writing in NOVRAM]

BKDV-200/201

(1) Press the keys in the following sequence.
① Press SET UP key while pressing INPUT CHECK key to select SYSTEM SCROLL MENU.
② Turn the search dial while pressing ENTRY key and center key to select [807 CHECKER MODE].
③ Press > key so as to move the cursor to EXECUTE.
④ Press ∧ key to execute the checker mode.
⑤ Press F4 (NVW)
⑥ Press SET key of Monitor Select key.

NOTE : Perform after ⑤ in step (1) if the SP checker mode is selected.

(2) Whenever F3 (/) key, the following addresses are displayed.
Refer to each section for the addresses to be changed. If addresses other than the above are displayed, turn off the power and perform alignments again.

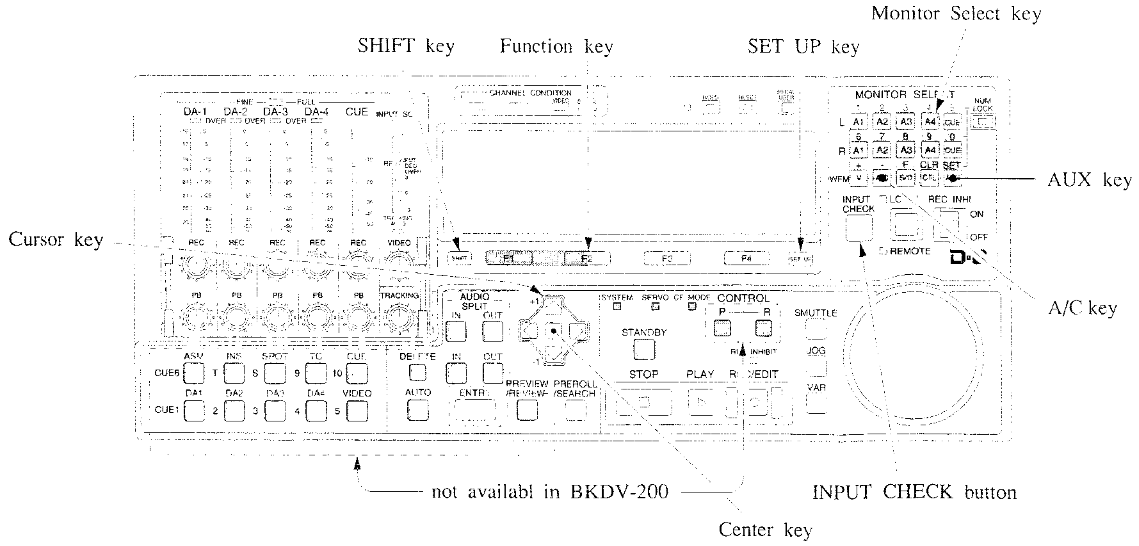
(3) Press F3 (/) key after checking the addresses on the control panel, "PUSH NVWR SW" is displayed.
Press S71 (NOVRAM WRITE Switch) on SP-15 (DVR-20/C20/20P/C20P) and SSP-07 (DVR-28/28P) boards.
Check that "READY" is appeared on the control panel, The NOVRAM data is renewed.

(4) Press the keys in the following sequence.
① Press SHIFT key.
② Press F4 (=) key.
③ Press 0 key of the monitor select key.
④ Press SET key of the monitor select key.
⑤ SET UP
Retaen to the home menu.

[Control panel keys]

BKDV-101 and BKDV-200/201 have different control panel operation.
The alphanumeric character in parenthess indicates the menu number to be selected.
Example : (D), (2), (F), and (SET)
For the operation.refer to the description below.

BKDV-200/201

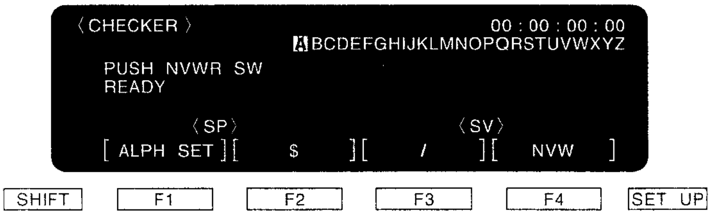


(1) Use as a numeric key into the checker mode.

(2) Press the Monitor Select key while pressing the INPUT CHECK button. In the case of BKDV-202, the INPUT CHECK button is LOCAL/REMOTE button. (Refer to the table below.)

NOTE: An alphabet can be also selected from among the second-line alphabets on the display.

To select "A", for example, select "A" using search dial and press F1 .



```
〈CHECKER〉                              00 : 00 : 00 : 00
                         ABCDEFGHIJKLMNOPQRSTUVWXYZ
  PUSH NVWR SW
  READY
               〈SP〉                     〈SV〉
  [ ALPH SET ][    $     ][    /     ][   NVW    ]
```

Table. Figures ↔ Alphabets

1	2	3	4	5	6	7	8	9	0
B	C	D	E	F					A

NOTE: The display of the Monitor Select keys mean the following it.
BKDV-200/201/202; The display on the Monitor Select key

SET : Used when entering a command or data.
+ : Used as a space key.
− : Deletes one character before the cursor.
CLR : Not operate

10-3. SERVO AUTOMATIC ALIGNMENT

- The following thirteen alignments can be performed as single alignment SEC.10-3.

(1) Capstan FG offset Alignment	SEC.10-5, STEP2
(2) Take-up Reel FG offset Alignment	SEC.10-7, STEP2
(3) Supply Reel FG Offset Alignment	SEC.10-6, STEP2
(4) Tape End Sensor Gain Alignment	SEC.10-8, STEP2
(5) Tape Top Sensor Gain Alignment	SEC.10-8, STEP3
(6) Tape Center (SAG) Sensor Gain Alignment	SEC.10-8, STEP4
(7) Tape-up Reel Motor Torque Alignment	SEC.10-7, STEP3
(8) Supply Reel Motor Torque Alignment	SEC.10-6, STEP3
(9) Capstan REC Speed Formet Speed Alignment	SEC.10-5, STEP3
(10) Capstan First Format Speed Alignment	SEC.10-5, STEP4
(11) Capstan FG Gain Alignment	SEC.10-5, STEP5
(12) Drum PG Polarity Alignment	SEC.10-4, STEP2
(13) Drum Speed Loop Alignment	SEC.10-4, STEP3

- For the (SET) key in the table,the SET key is used in BKDV-101 and the AUX key is used in BKDV-200 / 201.

Conditions for alignment	Specifications
STEP1 • VTR : Cassette out • Turn on the power and select the SV test menu.	
STEP2 • Press (C), (1), (1) and (SET) keys in the sequense. • Press > key • The automatic alignment starts.	DISPLAY C11 AUTO SV ADJ XXXXXXXXXXX SRT • Thirteen alignment comand is displayed in the sequence. DISPLAY AUTO SV ADJ FIN XXXX XXXX XXXX • Confirm that the following message is displayed.
STEP3 • Press (C),(0),and (SET) keys in the-sequence. • The alignment mode is completed.	DISPLAY C0 C MODE OFF • Confirm that the following message is displayed.
STEP4 ① Write in NOVRAM. (Refer to [Writing in NOVRAM] in pages 10-2 and 10-4) ② Address to be changed : A880, A881, A882, A883, A884, A885, A886, A887, A888, A889, A88A, A88B, A88C, A88D, A88E, A88F, A897, A898, A899, A89A, A89B, A89C, A89D, A89E, A8C2, A8C3, A8C4, A8C5, A8D0, A8FE, A8FF	

(Refer to Section 10-4 Drum Motor Alignment through Section 10-8 Tape Sensor Alignment for the details.)

10-4. DRUM MOTOR ALIGNMENT

• For the (SET) key in the table, the SET key is used in BKDV-101 and the AUX key is used in BKDV-200 / 201.

Conditions for alignment	Specifications
STEP1 • Connection : Refer to sec.10-2 • VTR : Cassette out • Switch / Jumper Settings : Same as sec.10-2 • Turn off the power and extend SP-15 board (For DVR-20/20/20P/C20P) and SSP-07 board (For DVR-28/28P) by the extension board. • Turn on the power and select the SV test menu.	
STEP2 • Press (C), (1), (D) and (SET) keys in the sequence. • Prss > key. • The drum PG polarity alignment starts.	DISPLAY DR PG P AJ SRT Alignments takes in 5 seconds. DISPLAY DR PG P AJ FIN • Confirm that the following message is displayed.
STEP3 • Press (C), (1), (E), and (SET) keys in the sequence. • Press > key. • The drum Speed loop alignment starts.	DISPLAY DR VELO AJ SRT Alignments takes in 20 seconds. DISPLAY DR VELO AJ FIN • Confirm that the following message is displayed.
STEP4 • Press (C), (0), and (SET) keys in the sequence. • The C Test mode is completed.	DISPLAY C0 C MODE OFF • Confirm that the following message is displayed.

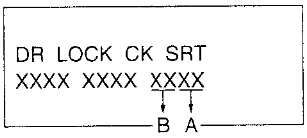
<table>
<tr><th>Conditions for alignment</th><th>Specifications</th></tr>
<tr><td>

STEP5

- Press (D), (2), (3), and (SET) keys in the sequence.
- Press [>] key.
- The drum Lock time check starts.

</td><td>

DISPLAY



Specification : (FOR DVR-20/C20/28) A≦78 (hexadecimal)
B≦B4 (hexadecimal)
(FOR DVR-20P/C20P/28P) A≦64 (hexadecimal)
B≦96 (hexadecimal)

"A" indicates the rise time and "B" indicates the fall time.

Alignment takes in 20 seconds.

DISPLAY

DR LOCK CK FIN

- Confirm that the following message is displayed.

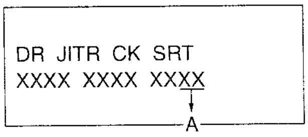
</td></tr>
<tr><td>

STEP6

- Press (D), (2), (6), and (SET) keys in the sequence.
- Press [>] key.
- The drum PG jitter check starts.

</td><td>

DISPLAY



Specification : A≦0B (hexadecimal)

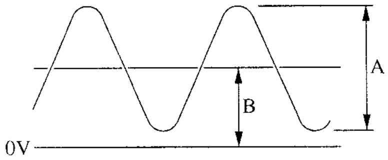
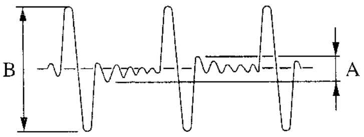
Alignment takes in 15 seconds.

DISPLAY

DR JITR CK FIN

- Confirm that the following message is displayed.

</td></tr>
</table>

Conditions for alignment	Specifications
STEP7 • Press (D), (2), (F), and (SET) keys in the sequence. • Press [>] key. • The drum waveform check starts.	DISPLAY DR WFM CHK SRT
STEP8 • Check the FG waveform. • Osilloscope 1V / DIV 200μ s / DIV	(For DVR-20 / C20 / 20P / C20P) CN411 Pin-27C/SP-15 (L9) and CN411 Pin-28B/SP15 (L9) (For DVR-28 / 28P) CN751 Pin-2C/SSP-07 (V12) and CN751 Pin-3B/SSP-07 (V12)  Specification : 1.5V≦A≦2.5V 4.2V dc≦B≦6.2V dc
STEP9 • Check the PG waveform. • Osilloscope 200mV / DIV 5ms / DIV	(For DVR-20 / C20 / 20P / C20P) CN411 Pin-28C / SP-15 (L9) (For DVR-28 / 28P) CN751 Pin-28C / SSP-07 (V12)  Specification : A≦0.13V p-p 0.5V≦B≦1.1V
STEP10 • Press (D), (0), and (SET) keys in the sequence. • The D test mode is completed.	DISPLAY D0 D MODE OFF • Confirm that the following message is displayed.

Conditions for alignment	Specifications
STEP11 ① Write in NOVRAM.(Refer to [Writing in NOVRAM] in pages 10-2 and 10-4) ② Address to be changed. A8D0 : DRUM PG DELAY BY FG PULSE (FOR DVR-20/C20/28) 5A or 5B (hexadecimal) (FOR DVR-20P/C20P/28P)58 or 59 (hexadecimal) A897 : DRUM VELOCITY LOOP REFERENCE (0) ALIGNMENT VALUE A898 : DRUM VELOCITY LOOP REFERENCE (1) ALIGNMENT VALUE A899 : DRUM VELOCITY LOOP REFERENCE (2) ALIGNMENT VALUE A89A : DRUM VELOCITY LOOP REFERENCE (3) ALIGNMENT VALUE A89B : DRUM VELOCITY LOOP REFERENCE (4) ALIGNMENT VALUE A8FE : CHECK SUM A8FF : CHECK SUM	

10-5. CAPSTAN MOTOR ALIGNMENT

For the (SET) key in the table, the SET key is used in BKDV-101 and the AUX key is used in BKDV-200 / 201.

Conditions for alignment	Specifications
STEP1 • VTR : Casette OUT • Turn on the power and select the SV test menu.	
STEP2 • Press (C), (1), (2), and (SET) keys in the sequence. • Press > key. • The capstan FG offset alignment starts.	DISPLAY C12 CP FG OFS ADJ CP FG OFS ADJ SRT 0202 XXXX XXXX DISPLAY CP FG OFS ADJ FIN 0202 XXXX XXXX A B • Confirm that the following message is displayed. A : Alignment value A of capstan FG B : Alignment value B of capstan FG
STEP3 • Press (C), (1), (A), and (SET) keys in the sequence. • Press > key. • The capstan REC speed alignment starts.	DISPLAY C1A CP N VEL ADJ CP N VEL AJ SRT 0A0A XXXX XXXX DISPLAY CP N VEL AJ FIN 0A0A XXXX XXXX A B • Confirm that the following message is displayed. A : Capstan speed (The REC speed corresponds to 0FA0H) B : Reference value of speed error measurement equipment (Reference : 2DEEH)

Conditions for alignment	Specifications
STEP4 • Press (C), (1), (B), and (SET) keys in the sequence. • Press $\boxed{>}$ key. • The capstan first format speed alignment starts.	DISPLAY C1B CP F VEL ADJ CP F VEL AJ SRT 0B0B XXXX XXXX DISPLAY CP F VEL AJ FIN 0B0B XXXX XXXX A B • Confirm that the following message is displayed. A : Capstan speed (The first format speed corresponds to 2EE0H) B : Reference value of speed error measurement equipment (Standard : 2DEEH)
STEP5 • Press (C), (1), (C), and (SET) keys in the sequence. • Press $\boxed{>}$ key. • The capstan FG gain alignment starts.	DISPLAY C1C CP FG G ADJ CP FG G ADJ SRT 0C0C XXXX XXXX DISPLAY CP FG G ADJ FIN 0C0C XXXX XXXX A B C • Confirm that the following message is displayed. A : Capstan speed (The REC speed corresponds to 0FA0H) B : A-phase correction volue of internal gain constant. C : B-phase correction volue of internal gain constant.

Conditions for alignment	Specifications
STEP6 • Press (C), (0), and (SET) keys in the sequence. • The C test mode is completed.	DISPLAY `C0 C MODE OFF` • Confirm that the following message is displayed.

STEP7

① Write in NOVRAM.(Refer to [Writing in NOVRAM] in pages 10-2 and 10-4)

② Address to be changed.

A880, A881 : Alignment value A of capstan FG.
A882, A883 : Alignment value B of capstan FG.
A8C2, A8C3 : Reference value of REC speed alignment. (2DEEH : Standard)
A8C4, A8C5 : Reference value of F.FORMAT speed alignment. (2DEEH : Standard)
A88D : A-phase correction value of internal gain constant during FG gain alignment. (00H : Standard, 01H : Correction value of about 0.8%)
A88C : B-phase correction value of internal gain constant during FG gain alignment. (00H : Standard, 01H : Correction value of about 0.8%)
A8FE : CHECK SUM
A8FF : CHECK SUM

10-6. SUPPLY REEL MOTOR ALIGNMENT

- For the (SET) key in the table.the [SET] key is used in BKDV-101 and the [AUX] key is used in BKDV-200 / 201.

Conditions for alignment	Specifications
STEP1 • VTR:Cassette OUT • Turn on the power and select the SV test menu.	

STEP2
• Press (C), (1), (4) and (SET) keys in the sequence.
• Press [>] key.
• The supply reel FG offset alignment starts.
	DISPLAY
	`C14 SRFG OFS ADJ`
	`SRFG OFS AJ SRT`
	`0404 XXXX XXXX`
	DISPLAY
	`SRFG OFS AJ FIN`
	`0404 XXXX XXXX`
	A B
	• Confirm that the following message is displayed.
	A : Alignment value A of supply reel motor FG
	B : Alignment value B of supply reel motor FG

STEP3
• Press (C), (1), (9) and (SET) keys in the sequence.
• Press [>] key.
• The supply reel motor torque alignment starts.
	DISPLAY
	`C19 SR TRQ ADJ`
	`SR TRQ ADJ SRT`
	`0909 XXXX XXXX`
	DISPLAY
	`SR TRQ ADJ FIN`
	`0909 XXXX XXXX`
	A B
	• Confirm that the following message is displayed.
	A : Measured acceleration
	B : Correction Value of supply reel torque

<table>
<tr><th>Conditions for alignment</th><th>Specifications</th></tr>
<tr><td>STEP4
• Press (C),(0),and (SET) keys in the sequence.
• The C test mode is completed.</td><td>DISPLAY
C0 C MODE OFF
• Confirm that the following message is displayed.</td></tr>
<tr><td colspan="2">STEP5
① Write in NOVRAM. (Refer to [Writing in NOVRAM] in pages 10-2 and 10-4)
② Address to be changed.
A884, A885 : Alignment value A of supply reel motor
A886, A887 : Alignment value B of supply reel motor
A88E : Correction value of supply reel motor torque (80H : Standard)
A8FE : CHECK SUM
A8FF : CHECK SUM</td></tr>
</table>

10-7. TAKE-UP REEL MOTOR ALIGNMENT

For the (SET) key in the table, the SET key is used in BKDV-101 and the AUX key is used in BKDV-200 / 201.

Conditions for alignment	Specifications
STEP1 • VTR : Cassette OUT • Turn on the power and select the SV test menu.	
STEP2 • Press (C), (1), (3) and (SET) keys in the sequence. • Press > key. • The take-up FG offset alignment starts.	DISPLAY C13 TRFG OFS ADJ TRFG OFS AJ SRT 0303 XXXX XXXX DISPLAY TRFG OFS AJ FIN 0303 XXXX XXXX A B • Confirm that the following message is displayed. A : Alignment value A of take-up reel motor FG B : Alignment value B of take-up reel motor FG
STEP3 • Press (C), (1), (8) and (SET) keys in the sequence. • Press > key. • The take-up reel motor torque alignment starts.	DISPLAY C18 TR TRQ ADJ TR TRQ ADJ SRT 0808 XXXX XXXX DISPLAY TR TRQ ADJ FIN 0808 XXXX XXXX A B • Confirm that the following message is displayed. A : Measured acceleration B : Correction value of take-up reel torque

Conditions for alignment	**Specifications**
STEP4 • Press (C), (0), and (SET) keys in the sequence. • The C test mode is completed.	DISPLAY C0 C MODE OFF • Confirm that the following message is displayed.
STEP5 ① Write in NOVRAM. (Refer to [Writing in NOVRAM] in pages 10-2 and 10- 4) ② Address to be changed A888, A889 : Alignment value A of take-up reel motor FG A88A, A88B : Alignment value B of take-up reel motor FG A88F : Correction value of take-up reel motor torque (80H : Standard) A8FE : CHECK SUM A8FF : CHECK SUM	

10-8. TAPE SENSOR ALIGNMENT

- For the (SET) key in the table, the SET key is used in BKDV-101 and the AUX key is used in BKDV-200 / 201.

Conditions for alignment	Specifications
STEP1 • VTR : Cassette OUT • Turn on the power and select the SV test menu.	

STEP2
• Press (C), (1), (5) and (SET) keys in the sequence.
• Press > Key
• The tape end sensor gain alignment starts.
	DISPLAY
	`C15 ENDSNR G ADJ`
	`ENDSNR G AJ SRT`
	`0505 XXXX XXXX`
	DISPLAY
	`ENDSNR G AJ FIN`
	`0505 XXXX XXXX`
	A B
	• Confirm that the following message is displayed.
	A : Alignment value of tape end sensor gain.
	B : Output value of tape end sensor : 2.4 V (7AH)

STEP3
• Press (C), (1), (6) and (SET) keys in the sequence.
• Press > key.
• The tape top sensor gain alignment starts.
	DISPLAY
	`C16 TOPSNR G ADJ`
	`TOPSNR G AJ SRT`
	`0606 XXXX XXXX`
	DISPLAY
	`TOPSNR G AJ FIN`
	`0606 XXXX XXXX`
	A B
	• Confirm that the following message is displayed.
	A : Alignment value of tape top sensor gain
	B : Output value of tape top sensor : 2.4 V (7AH)

<table>
<tr><th>Conditions for alignment</th><th>Specifications</th></tr>
<tr><td>STEP4
• Press (C), (1), (7) and (SET) keys in the sequence.
• Press [>] key.
• The tape center (SAG) sensor gain alignment starts.</td><td>DISPLAY
C17 CNRSNR G ADJ
CNRSNR G AJ SRT
0707 XXXX XXXX

DISPLAY
CNRSNR G AJ FIN
0707 XXXX XXXX
A B
• Confirm that the following message is displayed.

A : Alignment value of tape center sensor gain.
B : Output value of tape center sensor : 2.4 V(7AH)</td></tr>
<tr><td>STEP5
• Press (C), (0),and (SET) keys in the sequence.
• The C test mode iscompleted.</td><td>DISPLAY
C0 C MODE OFF
• Confirm that the following message is displayed.</td></tr>
<tr><td colspan="2">STEP6
① Write in NOVRAM.(Refer to [Writing in NOVRAM] in pages 10-2 and 10-4)
② Address to be changed
A89E : Alignment value of tape end sensor gain.
A89C : Alignment value of tape top sensor gain.
A89D : Alignment value of tape center (SAG) sensor gain.
A8FE : CHECK SUM
A8FF : CHECK SUM</td></tr>
</table>

10-9. DRUM PG, FG WAVEWORM CHECK

- Perform section 10-4 Drum Motor Alignment in step 1 and steps 7 through 10.

10-10. USG ALIGNMENT

- For the (SET) key in the table, the SET key is used in BKDV-101 and the AUX key is used in BKDV-200 / 201.

Conditions for alignment	Specifications
STEP1 • VTR : Cassette OUT • Turn on the power and select the SV test menu.	
STEP2 • Press (F), (2), (5), and (SET) keys in the sequence. • Keep pressing < key until USG reaches the threading position. • Shift USG to the threading position.	DISPLAY THCT ETEN TPOS
STEP3 • Press (F), (2), (0), and (SET) keys in the sequence. • The SP test menu is completed.	DISPLAY F20 TEST OFF • Confirm that the following message is displayed.
STEP4 • Select the USG test menu.	

Conditions for alignment	Specifications	
STEP5 • VTR : Cassette OUT • Press (C), (1), (1), and (SET) keys in the sequence. • Press [<] key • The automatic alignment of supply and take-up USG starts.	DISPLAY S-US OFS AJ SRT 0202 XXXX XXXX	• Supply side USG valtage tentative alignment is performed automatically.
	DISPLAY T-US OFS AJ SRT 0303 XXXX XXXX	• Take-up side USG voltage tentaitive alignment is performed automatically.
	DISPLAY S-US G ADJ SRT	• Supply side USG driving out alignment is performed automatically.
	DISPLAY T-US G ADJ SRT	• Take-up side USG driving out alignment is performed automatically.
	Alignment takes in one minute.	
	DISPLAY AUTO US ADJ FIN	• Confirm that the following message is displayed.
STEP6 • Press (C), (0), and (SET) keys in the sequence. • The USG test menu is completed.	DISPLAY C0 C MODE OFF	• Confirm that the following message is displayed.

Conditions for alignment	Specifications
STEP7 • Select the SP test menu.	
STEP8 • Press (F), (2), (5), and (SET) keys in the sequence. • Keep pressing [>] key until USG reaches the unthreading position. • Shift USG to the threading position.	DISPLAY `THCT ETEN TPOS`
STEP9 • Press (=), (0), and (SET) keys in the sequence. • The SP test menu is completed.	

10-11. TAPE TENSION ALIGNMENT

Perform the alignments.

- Supply side tape tentsion alignment.
  (DVR-20/C20/20P : SEC, 6-10-3, DVR-28/28P : SEC, 6-9-3)
- Take-up side tape tension alignment.
  (DVR-20/C20/20P : SEC, 6-12-4, DVR-28/28P : SEC, 6-11-4)

Perform supply side tape tension alignment when replacing DET-19 board, Perform take-up side tape tension alignment when replacing DET-18 board.

The tape running system must be accurately aligned before performing the above alignment.
Perform the tape running system check in accordance with Section 9. If necessary, perform the tape transport alignment befor the tape tension alignment.

10-12. SERVO SELF DIAGNOSTICS

- The following twenty-four diagnestics can be performed as single alignment SEC. 10-12.

(1) Capstan FG Offset Diagnostics.
(2) Take-up Reel FG Diagnostics.
(3) Supply Reel FG Diagnostics.
(4) Tape End Sensor Gain Diagnostics.
(5) Tape Top Sensor Gain Diagnostics.
(6) Tape Center (SAG) Sensor Diagnostics.
(7) Take-up Reel Motor Torque Diagnostics.
(8) Supply Reel Motor Touque Diagnostics.
(9) Capstan Motor Diagnostics.
(10) Capstan REC Speed Diagnostics.
(11) Capstan F.FORMAT Speed Diagnostics.
(12) Capstan FG Gain Diagnostics.
(13) Take-up Reel Brake Force Diagnostics.
(14) Supply Reel Brake Force Diagnostics
(15) Take-up Tension Sensor Diagnostics.
(16) Supply Tension Sensor Diagnostics.
(17) Drum Lock Up Diagnostics.
(18) Drum PG Polarity Diagnostics.
(19) Drum Speed Loop Diagnostics.
(20) Drum PG Jitter Diagnostcs.
(21) Threading Diagnostics.
(22) Cassette Compartment DOWN / UP Diagnostics.
(23) Reel Shift Diagnostics.
(24) TTP sensor Diagnostics.

- For the (SET) key in the table, the SET key is used in BKDV-101 and the AUX key is used in BKDV-200 / 201.

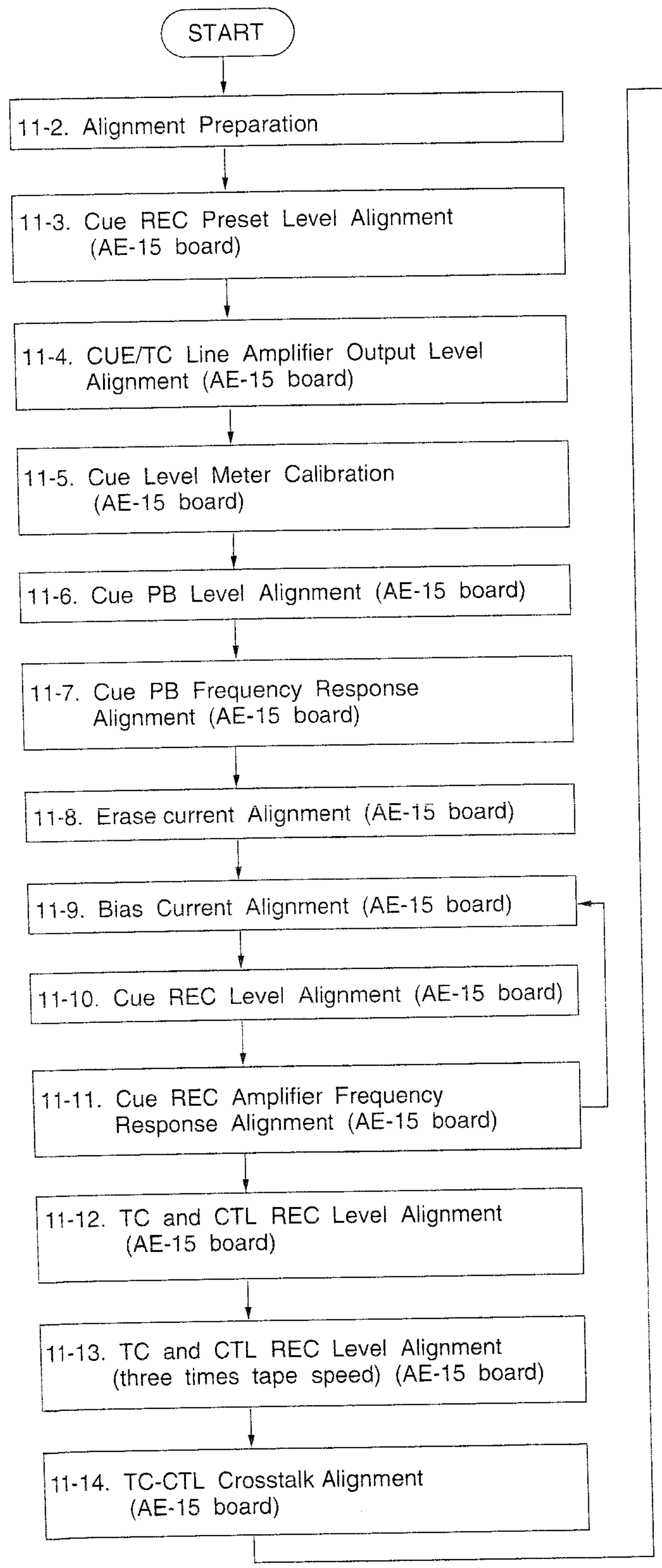
Conditions for alignment	**Specifications**
STEP1 • VTR : Cassette OUT • Turn on the power and select the SV test menu.	

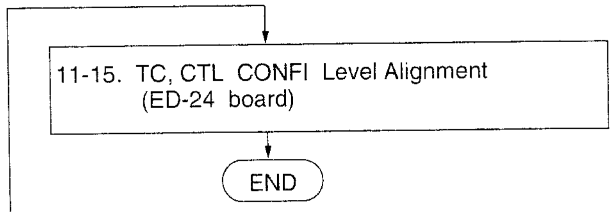
STEP2
• Press (D), (1), (1), and (SET) keys in the sequence.
• Press > key.
• The Self diagnostics starts.
	DISPLAY
	`D11 AUTO SV CHK`
	`XXXXXXXXXXX SRT`
	• Twenty-four diagnostics comand is displayed in the sequence.
	DISPLAY
	`AUTO SV CHK FIN`
	`XXXX XXXX XXXX`
	• Confirm that the following message is displayed.

STEP3 • Press (D), (0), and (SET) keys in the sequence. • The Self diagnostics mode is compled.	DISPLAY `D0 D MODE OFF`

SECTION 11
CUE, TC, CTL SIGNAL SYSTEM ALIGNMENT

11-1. ALIGNMENT SEQUENCE (AE-15/ED-24 BOARD)


START
11-2. Alignment Preparation
11-3. Cue REC Preset Level Alignment (AE-15 board)
11-4. CUE/TC Line Amplifier Output Level Alignment (AE-15 board)
11-5. Cue Level Meter Calibration (AE-15 board)
11-6. Cue PB Level Alignment (AE-15 board)
11-7. Cue PB Frequency Response Alignment (AE-15 board)
11-8. Erase current Alignment (AE-15 board)
11-9. Bias Current Alignment (AE-15 board)
11-10. Cue REC Level Alignment (AE-15 board)
11-11. Cue REC Amplifier Frequency Response Alignment (AE-15 board)
11-12. TC and CTL REC Level Alignment (AE-15 board)
11-13. TC and CTL REC Level Alignment (three times tape speed) (AE-15 board)
11-14. TC-CTL Crosstalk Alignment (AE-15 board)

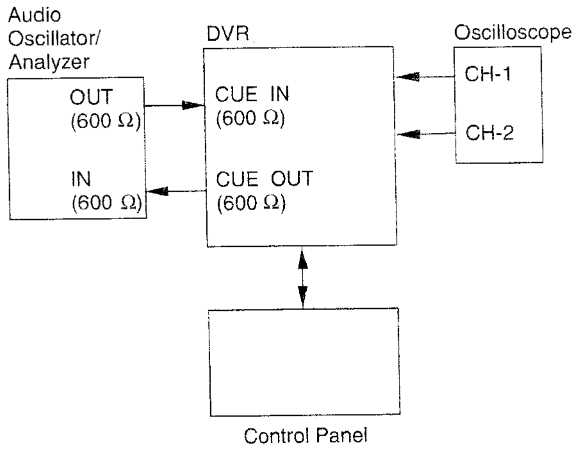

11-15. TC, CTL CONFI Level Alignment (ED-24 board)
END

11-2. ALIGNMENT PREPARATION

[Equipment Required]

- Oscilloscope (Equivalent product: 2445 or 2465/Tektronix)
- Audio oscillator/analyzer (Equivalent product: TM5006/Tektronix)
- Alignment Tape; ER5-2 PAL
- Digital Voltmeter (Equivalent product: 3435A/Hewlett Packard)
- Blank Tape (Equivalent product: D2M-34M)
- Extention board; EX-185

[Equipment Connection]


Audio Oscillator/ Analyzer
OUT (600 Ω)
IN (600 Ω)
DVR
CUE IN (600 Ω)
CUE OUT (600 Ω)
Oscilloscope
CH-1
CH-2
Control Panel

[Switch/Jumper initial setting]

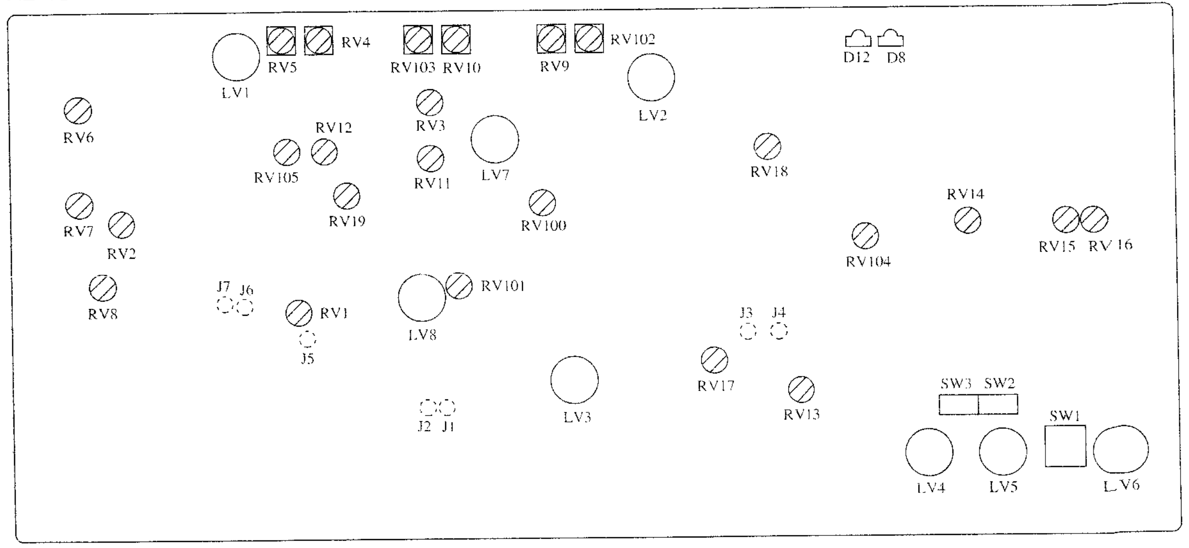
AE-15 Board
J1: ....SHORT
J2: ....OPEN
J3: ....SHORT
J4: ....SHORT
J5: ....SHORT
J6: ....SHORT
J7: ....OPEN

SW1 ....Completely adjusted when shipped
SW2 ....Completely adjusted when shipped
SW3 ....Completely adjusted when shipped

ED-24 Board
S1: ....ON

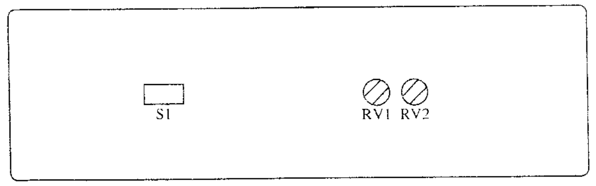
[Location]

AE-15 Board


RV4
RV5
RV103
RV10
RV9
RV102
D12
D8
LV1
LV2
RV6
RV12
RV3
RV105
RV11
LV7
RV18
RV7
RV2
RV19
RV100
RV14
RV15
RV16
RV104
RV8
J7
J6
RV1
RV101
LV8
J5
J3
J4
RV17
SW3
SW2
SW1
J2
J1
LV3
RV13
LV4
LV5
LV6

A SIDE
(J1~J7 : B SIDE)

ED-24 Board



A SIDE

[Control panel setting]

▨ : Indications when selecting the initial settings

BKDV-101

- AUDIO IN
  - F5 (CUE)
    - **UNITY**
    - VAR
  - F11 (SCALE)
    - **FULL**
    - FINE
  - F12 (SET UP)
    - F5 (CUE) — LINE (*1)
- AUDIO OUT
  - F5 (CUE)
    - **UNITY**
    - VAR
- TC & CHR
  - F1 (SOURCE)
    - **INT-TC**
    - EXT-TC
    - VITC
- MAN EDIT
  - F2 (INSERT)
    - ON
    - **OFF**
  - F9 (CUE)
    - ON
    - **OFF**
  - F10 (TC)
    - ON
    - **OFF**

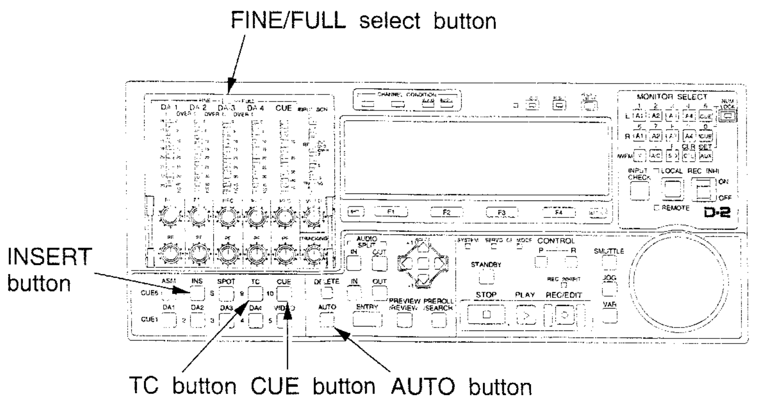
*1. Excluding DVR-C20/C20P.

BKDV-200/201

ENTRY + Search Dial or ENTRY + ∧ key/ ∨ key → Search Dial or ∧ key/ ∨ key → > key, ∧ key/ ∨ key, < key

- SET UP
  - AUDIO IN/OUT — 310 CUE INPUT SELECT
    - LINE
    - MIC
    - D-MIX
  - TC & CHARACTER — 401 TCG SOURSE SELECT
    - INT-TC
    - EXT-SLV
    - EXT-DRCT
    - VITC-SLV

- CUE of REC level adjustment knob
  - Pushed in — **UNITY**
  - Pulled out — VARIABLE
- CUE of PB level adjustment knob
  - Pushed in — **UNITY**
  - Pulled out — VARIABLE
- FINE/FULL select button
  - FINE
  - **FULL**
- AUTO button
  - ON
  - **OFF**
- INSERT button / CUE botton / TC botton
  - ON
  - **OFF**



11-3. CUE REC PRESET LEVEL ALIGNMENT (AE-15 Board)

Conditions for alignment	Specifications	Adjustments
• Connection: Same as Sec. 11-2. • VTR: STOP (EE) • Input signal (CUE IN): 1 kHz/+8 dBm	TP25/AE-15 (J3) – 0.44 Vdc	⊘RV104/AE-15 (J3) (CUE input VCA control level alignment)
• Switch/Jumper settings: Same as Sec. 11-2.	TP26/AE-15 (C2) – 0.44 Vdc	⊘RV105/AE-15 (C2) (CUE PB VCA control level alignment)
• Control panel settings: Same as Sec. 11-2.	TP1/AE-15 (A3) +3.0±0.1 dB	⊘RV1/AE-15 (D3) (CUE input level alignment)
• Digital Voltmeter • Audio oscillator/analyzer	TP4/AE-15 (G4) – 6.0±01 dB	⊘RV2/AE-15 (B3) (CUE UNITY level alignment)

11-4. CUE/TC LINE AMPLIFIER OUTPUT LEVEL ALIGNMENT (AE-15 Board)

Conditions for alignment	Specifications	Adjustments
STEP 1. • Connection: Same as Sec. 11-2. • VTR: STOP (EE) • Input signal (CUE IN): 1 kHz/+8 dBm • Switch/Jumper settings: Same as Sec. 11-2. • Control panel settings: Same as Sec. 11-2. • Audio oscillator/analyzer	CUE OUT +8.0±0.1 dBm	⊘RV17/AE-15 (G4) (CUE output level alignment)
STEP 2. • VTR: REC	TIME CODE OUT +1.20±0.01 Vrms (600 ohms load)	⊘RV13/AE-15 (H4) (TC output level alignment)

11-5. CUE LEVEL METER CALIBRATION (AE-15 Board)

Conditions for alignment	Specifications	Adjustments
• Connection: Same as Sec. 11-2. • VTR: STOP (EE) • Input signal (CUE IN): 1 kHz/+8 dBm • Switch/Jumper settings: Same as Sec. 11-2. • Control panel settings: AUDIO IN; (SCALE) = FINE Other settings are the same as Sec. 11-2. • Audio oscillator/analyzer	CUE level meter – 20±0 dB	⊘RV8/AE-15 (A3)

11-6. CUE PB LEVEL ALIGNMENT (AE-15 Board)

Conditions for alignment	Specifications	Adjustments
• Connection: Same as Sec. 11-2. • VTR: PB • Switch/Jumper settings: Same as Sec. 11-2. • Control panel settings: Same as Sec. 11-2. • Play back the 1 kHz/0 VU portion of ER5-2 PAL alignment tape. • Audio oscillator/analyzer	CUE OUT +8.0±0.1 dB	⊘ RV7/AE-15 (A2)

11-7. CUE PB FREQUENCY RESPONSE ALIGNMENT (AE-15 Board)

Conditions for alignment	Specifications	Adjustments
STEP 1. • Connection: Same as Sec. 11-2. • VTR: PB • Switch/Jumper settings: Same as Sec. 11-2. • Control panel settings: Same as Sec. 11-2. • Play back the 1 kHz/–10 VU portion of ER5-2 PAL alignment tape. • Audio oscillator/analyzer	CUE OUT – 2.0±0.1 dBm	⊘ Level Control/Function Control Panel (CUE PB level alignment)
STEP 2. • Play back the 10 kHz/–10 VU portion of ER5-2 PAL alignment tape.	CUE OUT – 2.0±0.1 dBm	⊘ RV6/AE-15 (A1) (CUE PB frequency response alignment)
STEP 3. • After the alignment is completed, perfom Section 11-6. CUE PB Level Alignment.		

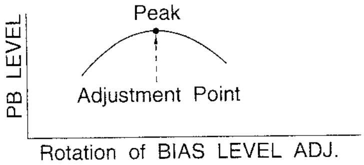
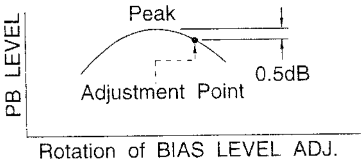
11-8. ERASE CURRENT ALIGNMENT (AE-15 Board)

Make the following alignments, shown in the table below, in each mode of CUE INSERT, TC INSERT, and CTL REC.

Conditions for alignment	Specifications	Adjustments
STEP 1. • Connection: Same as Sec. 11-2. • VTR: INSERT (CUE) • Switch/Jumper settings: Same as Sec. 11-2. • Control panel settings: (INSERT) = ON (CUE) = ON Other settings are the same as Sec. 11-2. • Oscilloscope AC 50 mV/DIV 200 mS/DIV	TP14/AE-15 (J5) Maximum level	SW3-2/AE-15 (K4) ⊘LV4/AE-15 (K4) (CUE channel erase current resonance alignment) • Set SW3-2 to the ON or OFF position so that the level is maximum.
STEP 2. • VTR: INSERT (TC) • Oscilloscope AC 50 mV/DIV 200 mS/DIV	TP16/AE-15 (K5) Maximum level	SW2-2/AE-15 (K4) ⊘LV5/AE-15 (C1) (TC channel erase current resonance alignment) • Set SW2-2 to the ON or OFF position so that the level is maximum.
STEP 3. • VTR: REC (CTL) • Press REC button and then set VTR to REC mode. • Oscilloscope AC 50 mV/DIV 200 mS/DIV	TP18/AE-15 (L5) Maximum level	SW1-1/AE-15 (L4) SW1-2/AE-15 (L4) SW1-3/AE-15 (L4) ⊘LV6/AE-15 (A1) (CTL channel erase current resonance alignment) • Set SW1-1, SW1-2 and SW1-3 to the ON or OFF position so that the level is maximum.

Conditions for alignment	**Specifications**	**Adjustments**
STEP 4. • VTR: INSERT (CUE) • Control panel settings: (INSERT) = ON (CUE) = ON • Oscilloscope AC 50 mV/DIV 200 mS/DIV	TP14/AE-15 (J5) 210±10 mVp-p	⊘RV14/AE-15 (K2) (CUE channel erase current alignment)
STEP 5. VTR: INSERT (TC) • Oscilloscope AC 50 mV/DIV 200 mS/DIV	TP16/AE-15 (K5) 160±10 mVp-p	⊘RV15/AE-15 (L2) (TC channel erase current alignment)
STEP 6. VTR: REC (CTL) • Press [REC] button and then set VTR to REC mode. • Oscilloscope AC 50 mV/DIV 200 mS/DIV	TP18/AE-15 (L5) 550^{+0}_{-40} mVp-p	⊘RV16/AE-15 (L2) (CTL channel erase current alignment)

11-9. BIAS CURRENT ALIGNMENT (AE-15 Board)

Conditions for alignment	Specifications	Adjustments
STEP 1. • Connection: Same as Sec. 11-2. • VTR: REC • Switch/Jumper settings: Same as Sec. 11-2. • Control panel settings: Same as Sec. 11-2. • Oscilloscope AC 20 mV/DIV 2 mS/DIV	CUE; TP3/AE-15 (B2) Maximum level TC; TP8/AE-15 (F4) Maximum level CTL; TP21/AE-15 (G2) Maximum level	⊘LV1/AE-15 (C1) (CUE REC Bias current resonance alignment) ⊘LV3/AE-15 (F4) (TC REC Bias current resonance alignment ②) ⊘LV8/AE-15 (E3) (TC REC Bias current resonance alignment ①) ⊘LV2/AE-15 (G1) (CTL REC Bias current resonance alignment ②) ⊘LV7/AE-15 (F2) (CTL REC Bias current resonance alignment ①)
STEP 2. • Oscilloscope AC 20 mV/DIV 2 mS/DIV	CTL; TP21/AE-15 (G2) 60±5 mVp-p	RV100/AE-15 (F2)
STEP 3. • Connection: Same as Sec. 11-2. • VTR: REC → PB • Oscilloscope AC 500 mV/DIV 2 mS/DIV	TP9/AE-15 (G1)  • Repeat self recording and playing back to adjust ⊘RV101 until TC PB level is at a peak.	⊘RV101/AE-15 (E3) 1. Turn the TC Bias Level control ⊘RV101/AE-15 (E3) fully counter-clockwise. 2. Set VTR into REC mode. 3. Turn gradually this control clockwise. 4. Play back the recorded portion and search for the peak point of TC PB level.
STEP 4. • Input signal (CUE IN): 6.3 kHz/–2 dBm • VTR: REC→PB • Switch/Jumper settings: Same as Sec. 11-2. • Control panel settings: Same as Sec. 11-2. • Oscilloscope AC 100 mV/DIV 2 mS/DIV	TP4/AE-15 (G4)  • Repeat self recording and playing back to adjust ⊘ RV3 until CUE PB level is –0.5dB over a peak .	⊘RV3/AE-15 (E1) (CUE Bias level alignment) 1. Turn the CUE Bias Level control RV3/AE-15 (E1) fully counter-clockwise. 2. Put VTR into REC mode. 3. Turn gradually this control clockwise. 4. Play back the recorded portion and search for the peak point of CUE PB level. 5. Adjust ⊘ RV3 that CUE PB level is –0.5dB over a peak.

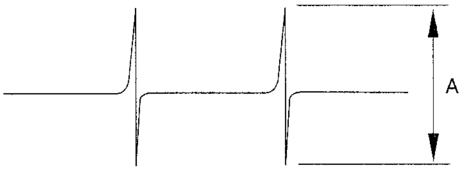
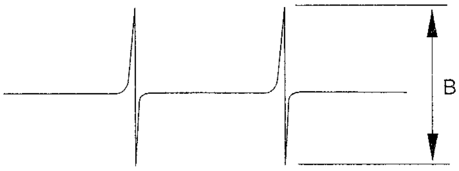
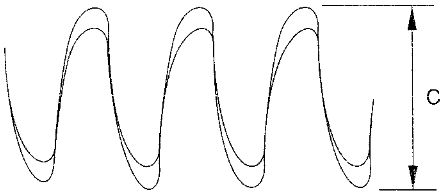
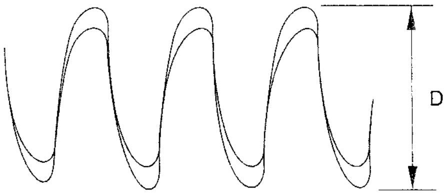
11-10. CUE REC LEVEL ALIGNMENT (AE-15 Board)

Conditions for alignment	**Specifications**	**Adjustments**
STEP 1. • Connection: Same as Sec. 11-2. • VTR: STOP • Input signal (CUE IN): 1 kHz/–8 dBm • Switch/Jumper settings: Same as Sec. 11-2. • Control panel settings: Same as Sec. 11-2. • Audio oscillator/analyzer	CUE OUT +8.0±0.1 dBm	(Check) If the specification is not met, perform Section 11-4. CUE/TC Line Amplifier Output Level Alignment.
STEP 2. • Play back 1 kHz/0 VU portion of ER5-2 PAL alignment tape.	CUE OUT +8.0±0.1 dBm	If the specification is not met, perform Section 11-6. CUE PB Level Alignment.
STEP 3. • Using a commercially available cassette tape, perform self recording and playing back 1 kHz/+8 dBm signal. Play back the recorded portion.	CUE OUT +8.0±0.1 dBm	⊘RV4/AE-15 (D1) • If the specification is not met, turn ⊘RV4/AE-15 (D1) slightly and repeat the procedure of STEP 3.

11-11. CUE REC AMPLIFIER FREQUENCY RESPONSE ALIGNMENT (AE-15 Board)

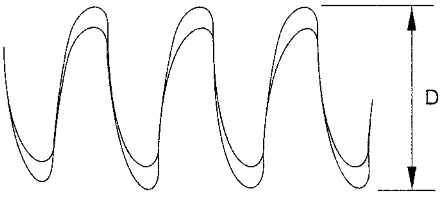
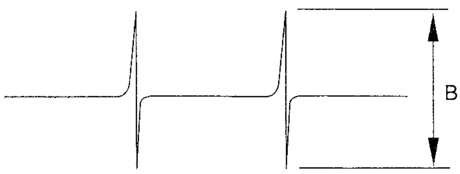
Conditions for alignment	**Specifications**	**Adjustments**
STEP 1. • Connection: Same as Sec. 11-2. • VTR: STOP • Input signal (CUE IN): 1 kHz/+8 dBm • Switch/Jumper settings: Same as Sec. 11-2. • Control panel settings: Same as Sec. 11-2. • Perform STEP 1 of Section 11-10 CUE REC Level Alignment. • Audio oscillator/analyzer	CUE OUT +4.0±0.1 dBm	(Check)
STEP 2. • VTR: REC → PB • Input signal (CUE IN): 1 kHz/–2 dBm 10 kHz/–2 dBm • Using commercially available cassette tape, record 1 kHz/– 2 dBm signal and 10 kHz/– 2 dBm signal on CUE channel respectively. Play back the recorded portion.	CUE OUT 10 kHz level = 1 kHz level ±0.5 dBm (1 kHz: Reference)	⊘RV5/AE-15 (C1) • If the level is not met specifications, turn ⊘RV5/AE-15 (C1) slightly and repeat the procedure of STEP 2.
STEP 3. • After alignment is completed, perform STEPs 2 and 3 of Section 11-8 CUE REC Level Alignment.		

11-12. TC AND CTL REC LEVEL ALIGNMENT (AE-15 Board)

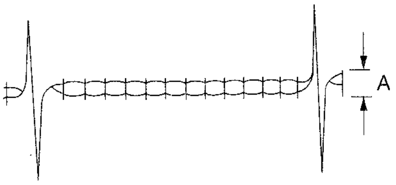
Conditions for alignment	Specifications	Adjustments
STEP 1. • Connection: Same as Sec. 11-2. • VTR: PB • Switch/Jumper settings: Same as Sec. 11-2. • Control panel settings: Same as Sec. 11-2. • Play back ER5-2 PAL alignment tape. • Oscilloscope AC 500 mV/DIV 2 mS/DIV	TP19/AE-15 (H1)  A=1.95±0.05 Vp-p • Check the PB CTL level to meet the requirement.	⊘RV18/AE-15 (H2) (PB CTL level check) • If the specification is not met, turn ⊘ RV9/AE-15 (F1) slightly and repeat the procedure of STEP 1.
STEP 2. • VTR: REC → PB • Using commercially available tape, perform self recording and play back the recorded portion.	TP19/AE-15 (H1)  B=A±0.1 Vp-p	⊘RV9/AE-15 (F1) (REC CTL level alignment) • If the specification is not met, turn ⊘RV9/AE-15 (F1) slightly and repeat the procedure of STEP 2.
STEP 3. • Connection: Same as Sec. 11-2. • VTR: PB • Play back ER5-2 PAL alignment tape. • Oscilloscope AC 500 mV/DIV 2 mS/DIV	TP9/AE-15 (G1)  $C=1.8^{+0.8}_{-0.6}$ Vp-p • Check the PB TC level to meet thge requirement.	(PB TC level check)
STEP 4. • VTR: REC → PB • Using commercially available tape, perform self recording and play back the recorded portion.	TP9/AE-15 (G1)  D=C±0.1 Vp-p	⊘RV10/AE-15 (E1) (REC TC level alignment) • If the specification is not met, turn⊘ RV10/AE-15 (E1) slightly and repeat the procedure of STEP 2.

11-13. TC AND CTL REC LEVEL ALIGNMENT (three times tape speed) (AE-15 Board)

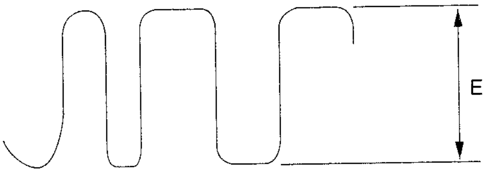
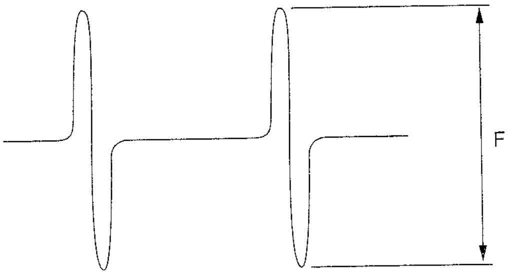
Perform Section 11-12 TC and CTL REC Level Alignment befor this alignment.

Conditions for alignment	Specifications	Adjustments
STEP 1. • Connection: Same as Sec. 11-2. • VTR: FORMAT→PB • Switch/Jumper settings: Same as Sec. 11-2. • Control panel settings: Same as Sec. 11-2. • Using commercially available cassette tape, perform three times tape speed recording and playing back the recorded portion. • Oscilloscope 500 mV/DIV 2 mS/DIV	TP9/AE-15 (G1)  D=C±0.1 Vp-p (C = the value of STEP 3 in Section 11-12 PB TC Level))	⊘RV103/AE-15 (E1) (REC TC Level Alignment (three times tape speed)) • If the specification is not met, turn ⊘ RV103/AE-15 (E1) slightly and repeat the procedure.
STEP 2. • VTR: FORMAT→PB • Using commercially available cassette tape, perform three times tape speed recording and playing back the recorded portion. • Oscilloscope AC 500 mV/DIV 2 mS/DIV	TP19/AE-15 (H1)  B=A±0.1 Vp-p (A = the value of STEP 1 in Section 11-12. PB CTL Level))	⊘RV102/AE-15 (F1) (REC CTL Level Alignment (three times tape speed)) • If the specification is not met, turn ⊘ RV102/AE-15 (F1) slightly and repeat the procedure.

11-14. TC-CTL CROSSTALK ALIGNMENT (AE-15 Board)

Conditions for adjustment	Specifications	Adjustments
• Connection: Same as Sec. 11-2. • VTR: REC → TC INSERT • Switch/Jumper settings: Same as Sec. 11-2. • Control panel settings: Same as Sec. 11-2. • Using commercially available cassette tape and set VTR into REC mode. • Set VTR into TC INSERT mode while playing back the recorded portion. • Oscilloscope AC 500 mV/DIV 2 mS/DIV	CTL; TP19/AE-15 (H1)  A≦0.3 Vp-p or less • Adjust ⊘ RV11, ⊘ RV12 and ⊘ RV19 to minimize the crosstalk.	⊘RV11/AE-15 (E2) (TC-CTL Closstalk canceler frequency response alignment) ⊘RV12/AE-15 (D2) (TC-CTL Closstalk canceler level algintment) ⊘RV19/AE-15 (D2) (TC-CTL Closstalk canceler high frequency gain alignment)

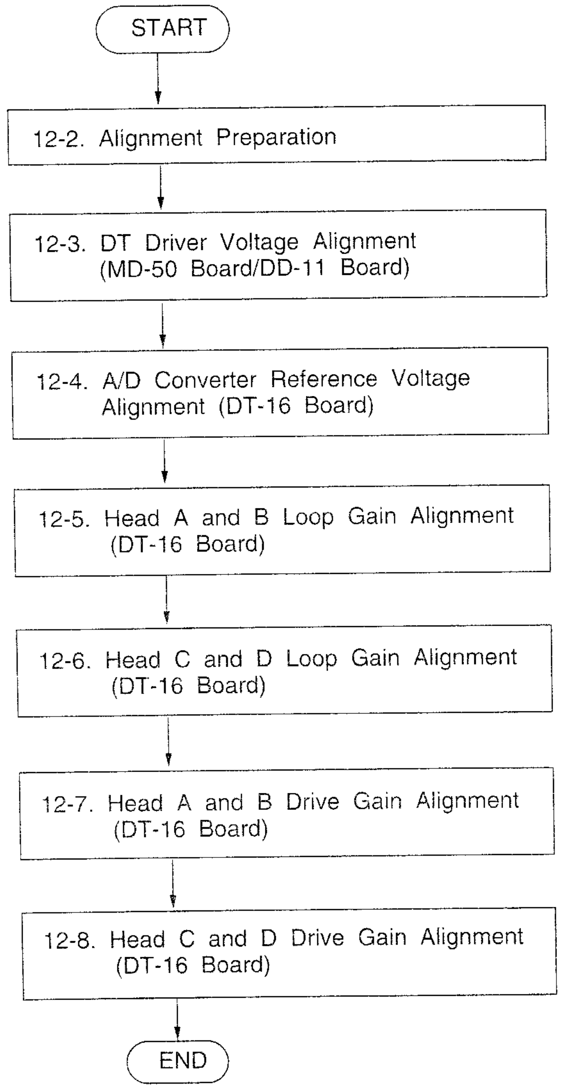
11-15. TC, CTL CONFI LEVEL ALIGNMENT (ED-24 Board)

Conditions for alignment	Specifications	Adjustments
STEP 1. • Connection: Same as Sec. 11-2. • VTR: REC • Switch/Jumper settings: Same as Sec. 11-2. • Control panel settings: Same as Sec. 11-2. • Oscilloscope AC 500 mV/DIV 100 uS/DIV	TP5/ED-24 (C1)  E=C±0.1 Vp-p (C=the value of STEP 3 in Section 11-12. PB TC Level)	⊘RV1/ED-24 (D2)
STEP 2. • VTR: REC • Oscilloscope AC 200 mV/DIV 100 uS/DIV	TP1/ED-24 (C5)  F=A±0.1 Vp-p (A=the value of STEP 1 in Section 11-12. PB CTL)	⊘RV2/ED-24 (D2)

SECTION 12
DT SYSTEM ALIGNMENT

12-1. ALIGNMENT SEQUENCE (MD-50/DD-11/DT-16 BOARD)

- Before aligning the DT system, align the tape transport system, PG phase, CTL phase, RF signal system and the video signal system.

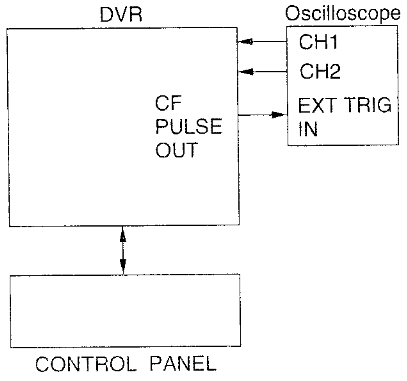

START
12-2. Alignment Preparation
12-3. DT Driver Voltage Alignment (MD-50 Board/DD-11 Board)
12-4. A/D Converter Reference Voltage Alignment (DT-16 Board)
12-5. Head A and B Loop Gain Alignment (DT-16 Board)
12-6. Head C and D Loop Gain Alignment (DT-16 Board)
12-7. Head A and B Drive Gain Alignment (DT-16 Board)
12-8. Head C and D Drive Gain Alignment (DT-16 Board)
END

12-2. ALIGNMENT PREPARATION

[Equipment Required]

- Digital voltmeter
  (Equivalent product: 3435A/Hewlett Packard)
- Oscilloscope
  (Equivalent product: 2445 or 2465/Tektronix)
- Alignment tape ER5-2 PAL

[Equipment Connection]


DVR
Oscilloscope
CH1
CH2
CF PULSE OUT
EXT TRIG IN
CONTROL PANEL

[Switch/Jumper initial setting]

SW1-1, 2 ....ON
SW2-1, 2, 3, 4, 5, 6, 7, 8 ....OFF
JP1/2 ....SHORT

[Initial Setting of adjustment]

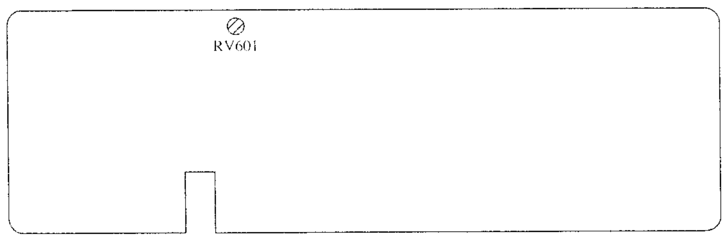
Set the following adjustment volumes to their respective mechanical centers.

DT-16 board:
⊘RV101 (A1), RV102 (B1), RV103 (D1), RV105 (E3) and RV106 (B5).

RV102 (B1) and RV106 (B5) are 3 turns models.
Set them to their respective mechanical centers.

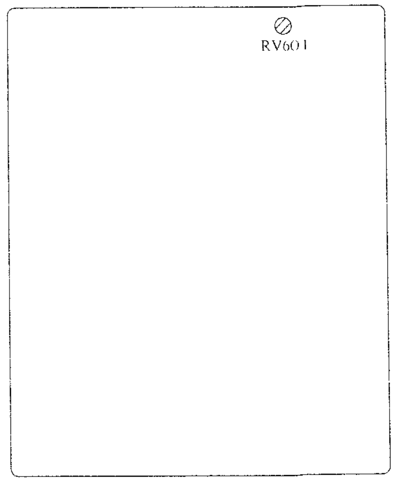
[Location]

MD-50 Board



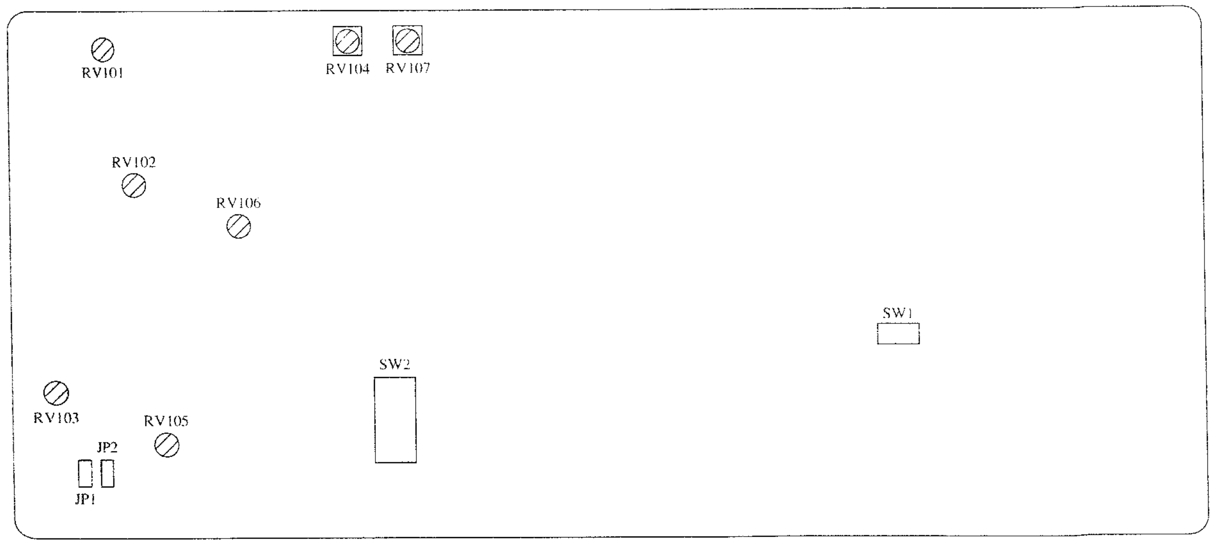
COMPONENT SIDE

DD-11 Board



COMPONENT SIDE

DT-16 Board

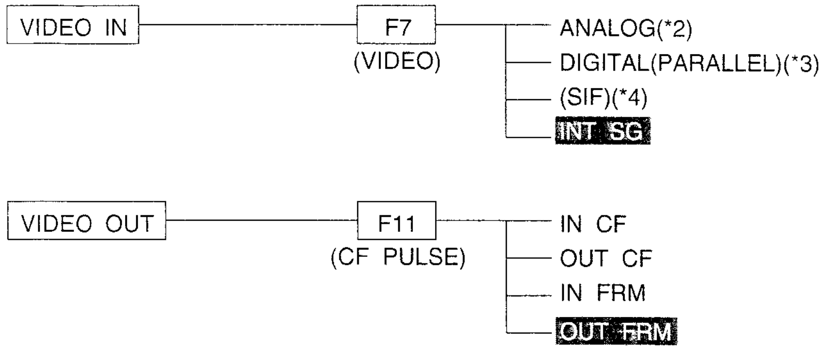

RV101
RV104
RV107
RV102
RV106
SW1
SW2
RV103
RV105
JP2
JP1

COMPONENT SIDE (A SIDE)

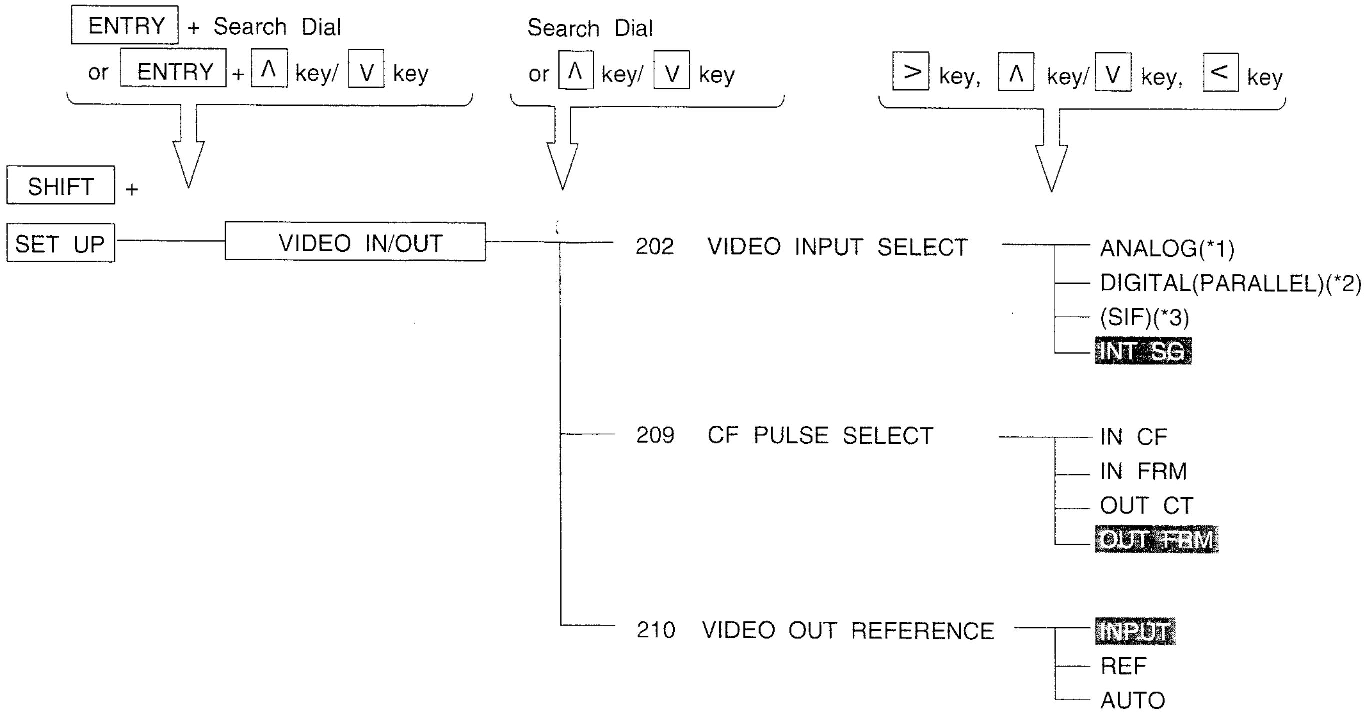
[Control panel setting]

▨ : Indications when selecting the initial settings

BKDV-101


VIDEO IN
F7
(VIDEO)
ANALOG(*2)
DIGITAL(PARALLEL)(*3)
(SIF)(*4)
INT SG
VIDEO OUT
F11
(CF PULSE)
IN CF
OUT CF
IN FRM
OUT FRM

BKDV-201/200/202


ENTRY + Search Dial
or ENTRY + Λ key/ V key
Search Dial
or Λ key/ V key
> key, Λ key/ V key, < key
SHIFT +
SET UP
VIDEO IN/OUT
202 VIDEO INPUT SELECT
ANALOG(*1)
DIGITAL(PARALLEL)(*2)
(SIF)(*3)
INT SG
209 CF PULSE SELECT
IN CF
IN FRM
OUT CT
OUT FRM
210 VIDEO OUT REFERENCE
INPUT
REF
AUTO

*1. This can be enabled by the USER HOLE of the cassette.

*2. In the DVR-C20, ANALOG mode cannot be selected.

*3. Indications in parentheses can be selected only when the SERIAL INTERFACE (optional accessory) is inserted.

*4. Indications in parentheses can be selected only when the SERIAL INTERFACE (optional accessory) is inserted.

SERIAL INTERFACE BOARD :
BKDV-105 : Corresponding to DVR-28
BKDV-106 : Corresponding to DVR-28P
BKDV-205 : Corresponding to DVR-20/C20
BKDV-206 : Corresponding to DVR-20P/C20P

12-3. DT DRIVER VOLTAGE ALIGNMENT (MD-50 Board: FOR DVR-20P/C20P) (DD-11 Board: FOR DVR-28P)

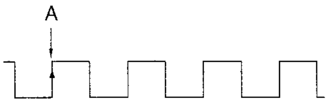
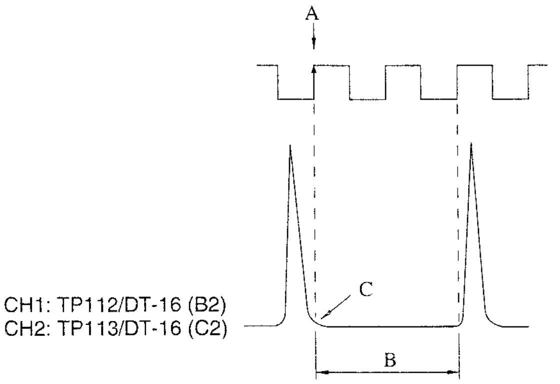
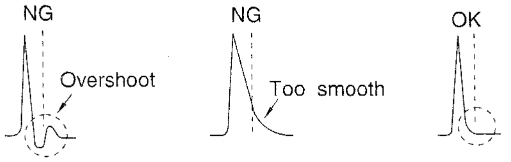
Note 1: Make the following alignments when the components on MD-50 board or DD-11 board are replaced.
Note 2: Be careful not to short with the shieldcase when connecting a digital voltmeter.

Conditions for alignment	Specifications	Adjustments
• VTR: STOP	TP601/MD-50 (A1) TP601/DD-11 (C2)	⊘ RV601/MD-50 (D1) ⊘ RV601/DD-11 (A3)
• Digital Voltmeter	$+200\ ^{+5}_{-0}$ Vdc	

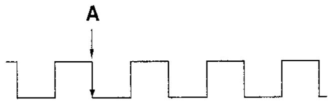
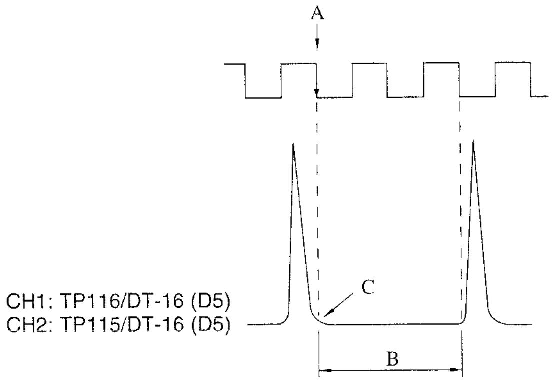
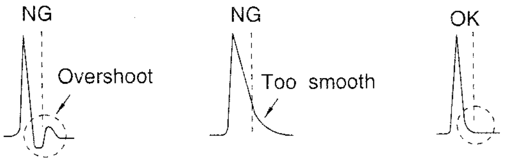
12-4. A/D CONVERTER REFERENCE VOLTAGE ALIGNMENT (DT-16 Board)

Conditions for alignment	Specifications	Adjustments
• Connection: Same as Sec. 12-2. • VTR: STOP • Switch/Jumper settings: Same as Sec. 12-2. • Control panel settings: Same as Sec. 12-2. • Digital Voltmeter	TP105/DT-16 (A1) +5.00 ± 0.01 Vdc	⊘ RV101/DT-16 (A1)

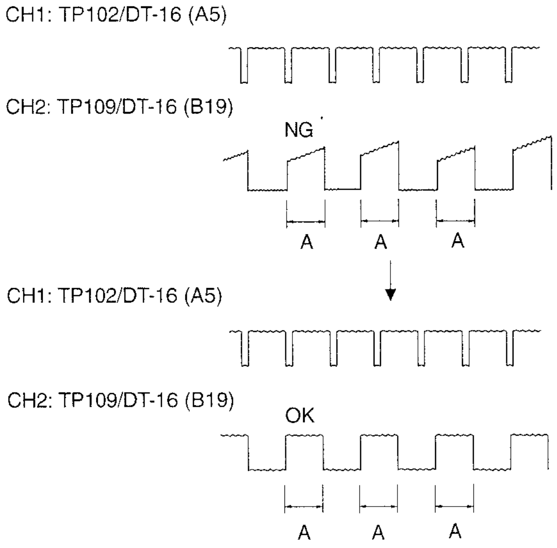
12-5. HEAD A AND B LOOP GAIN ALIGNMENT (DT-16 Board)

Conditions for alignment	Specifications	Adjustments
STEP 1. • Connection: Same as Sec. 12-2. • VTR: VAR (×–1.0 tape speed) • Switch/Jumper settings: SW1-1/2 (C16): OFF Other settings are the same as Sec. 12-2. • Control panel settings: Same as Sec. 12-2. • Play back the color bars portion of the Alignment tape ER5-2 (PAL). • Oscilloscope 2V/DIV 5mS/DIV TRIG: EXT(–)	CN407 Pin-9C/DT-16 (E14)  • Adjust the horizontal position control knob of the oscilloscope so that the rising edge of the waveform (part A) coincides with the second scale division from left on the scope screen.	Oscilloscope; Horizontal position control knob
STEP 2.	CN407 Pin-9C/DT-16 (E14)  A C CH1: TP112/DT-16 (B2) CH2: TP113/DT-16 (C2) B • Align the VAR GAIN control knob of CH-1 on the oscilloscope until the waveform at part B becomes horizontal.	Oscilloscope; VAR GAIN control knob of CH1
• Oscilloscope CH1: 0.2 V/DIV CH2: 0.2 V/DIV **INVERT** 5 mS/DIV MODE: ADD TRIG: EXT (–)	 • Adjust ⊘ RV103/DT-16 (D1) so that the waveform at part C has no overshoot and not too smooth and also the waveform at part B is horizontal. • Repeat STEP 2 several times.	⊘ RV103/DT-16 (D1)
STEP 3. • Switch SW1-1 and SW1-2/DT-16 (C16) on.		

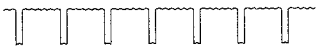
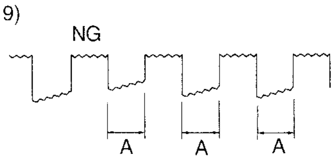
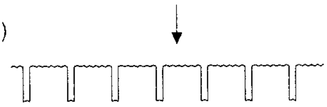
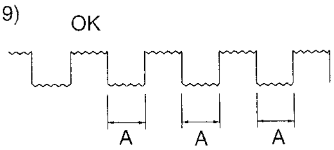
12-6. HEAD C AND D LOOP GAIN ALIGNMENT (DT-16 Board)

Conditions for alignment	Specifications	Adjustments
STEP 1. • Connection: Same as Sec. 12-2. • VTR: VAR (×–1.0 tape speed) • Switch/Jumper settings: SW1-1/2 (C16): OFF Other settings are the same as Sec. 12-2. • Control panel settings: Same as Sec. 12-2. • Play back color bars portion of the Alignment tape ER5-2 (PAL). • Oscilloscope 2V/DIV 5mS/DIV TRIG: EXT (–)	CN407 Pin-9C/DT-16 (E14)  • Adjust the horizontal position control knob of the oscilloscope so that the fall edge of the waveform (part A) coincides with the second scale division from left on the scope screen.	Oscilloscope; Horizontal position control knob
STEP 2.	CN407 Pin-9C/DT-16 (E14)  A CH1: TP116/DT-16 (D5) CH2: TP115/DT-16 (D5) C B • Align the VAR GAIN control knob of CH-1 on the oscilloscope until the waveform at part B becomes horizontal.	Oscilloscope; VAR GAIN control knob of CH1
• Oscilloscope CH1: 0.2 V/DIV CH2: 0.2 V/DIV **INVERT** 5 mS/DIV MODE: ADD TRIG: EXT (–)	 • Adjust ❷RV105/DT-16 (D2) so that the waveform at part C has no overshoot and not too smooth and also the waveform at part B is horizontal. • Repeat STEP 2 several times.	❷ RV105/DT-16 (D2)
STEP 3. • Switch SW1-1 and SW1-2/DT-16 (C16) on.		

12-7. HEAD A AND B DRIVE GAIN ALIGNMENT (DT-16 Board)

Conditions for alignment	Specifications	Adjustments
STEP 1. • Connection: Same as Sec. 12-2. • VTR: STILL • Switch/Jumper settings: SW1-1/2 (C16): OFF Other settings are the same as Sec. 12-2. • Control panel settings: Same as Sec. 12-2. • Playback the color bars portion of the Alignment tape ER5-2 (PAL). • Oscilloscope CH1: 0.5 V/DIV CH2: 0.5 V/DIV 5 mS/DIV TRIG: EXT (−)	 CH1: TP102/DT-16 (A5) CH2: TP109/DT-16 (B19) NG A A A CH1: TP102/DT-16 (A5) CH2: TP109/DT-16 (B19) OK A A A • Coarse adjust ⊘ RV102/DT-16 (B1) so that the waveform at part A becomes horizontal in average.	⊘ RV102/DT-16 (B1) (Coarse adjustment)
STEP 2. VTR: VAR (×-1, ×+3 tape speed) • Playback the color bars portion of the Alignment tape ER5-2 (PAL).	• Fine adjust ⊘ RV102/DT-16 (B1) so that the waveform at part A becomes horizontal in average and fluctuation in the RF envelope becomes minimum at both −1 times and +3 times tape speed.	⊘ RV102/DT-16 (B1) (Fine adjustment)
STEP 3. • Switch SW1-1 and SW1-2/DT-16 (C16) on.		

12-8. HEAD C AND D DRIVE GAIN ALIGNMENT (DT-16 Board)

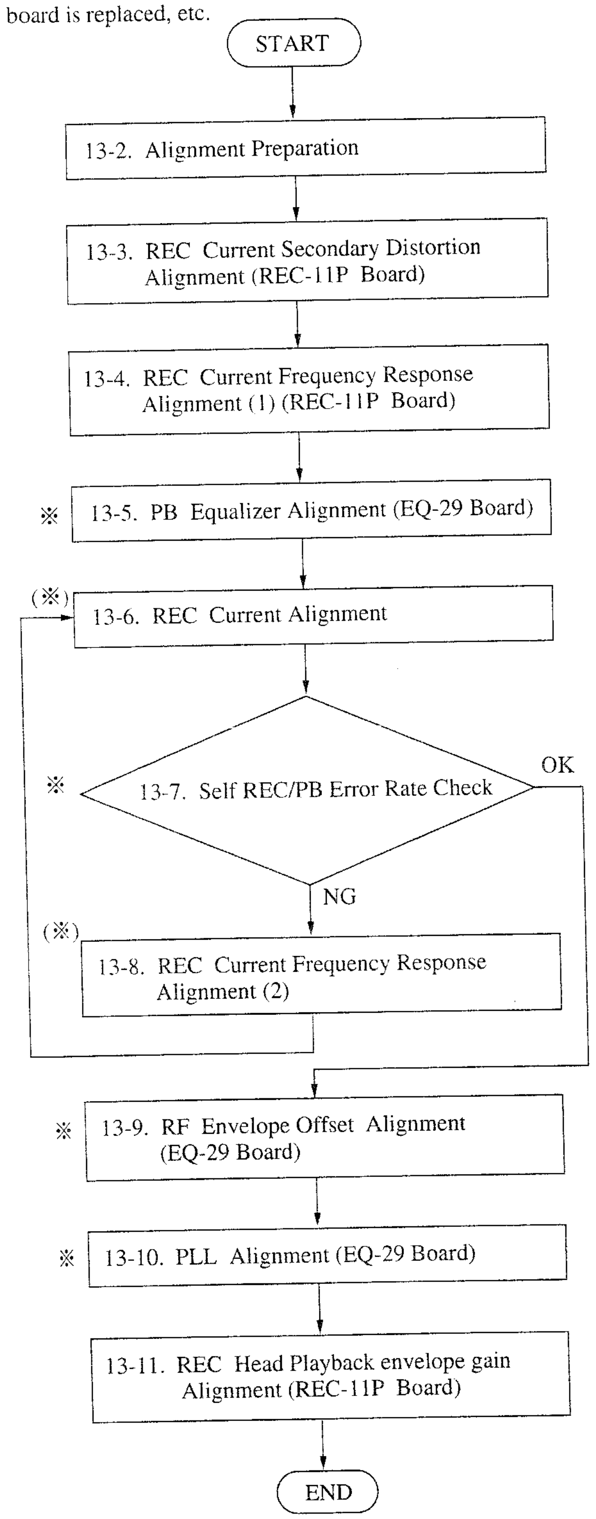
Conditions for alignment	Specifications	Adjustments
STEP1. • Connection: Same as Sec. 12-2. • VTR: STILL • Switch/Jumper settings: SW1-1/2 (C16): OFF Other settings are the same as Sec. 12-2. • Control panel settings: Same as Sec. 14-2. • Play back color bars portion of the Alignment tape ER5-2 (PAL). • Oscilloscope CH1: 0.5 V/DIV CH2: 0.5 V/DIV 5 mS/DIV TRIG: EXT (–)	CH1: TP102/DT-16 (A5)  CH2: TP109/DT-16 (B19)  CH1: TP102/DT-16 (A5)  CH2: TP109/DT-16 (B19)  • Coarse adjust ⊘RV106/DT-16 (B5) so that the waveform at part A becomes horizontal in average.	⊘RV106/DT-16 (B5) (Coarse adjustment)
STEP 2. VAR: VAR (×-1, ×+3 tape speed) • Play back color bars portion of the Alignment tape ER5-2 (PAL).	• Fine adjust ⊘RV106/DT-16 (B5) so that the waveform at part A becomes horizontal in average and fluctuation in the RF envelope becomes minimum at both –1 time and +3 times tape speed.	⊘RV106/DT-16 (B5) (Fine adjustment)
STEP 3. • Switch SW1-1 and SW1-2/DT-16 (C16) on.		

SECTION 13
RF SIGNAL SYSTEM ALIGNMENT

13-1. ALIGNMENT PROCEDURE

[Alignment Flowchart (1)]

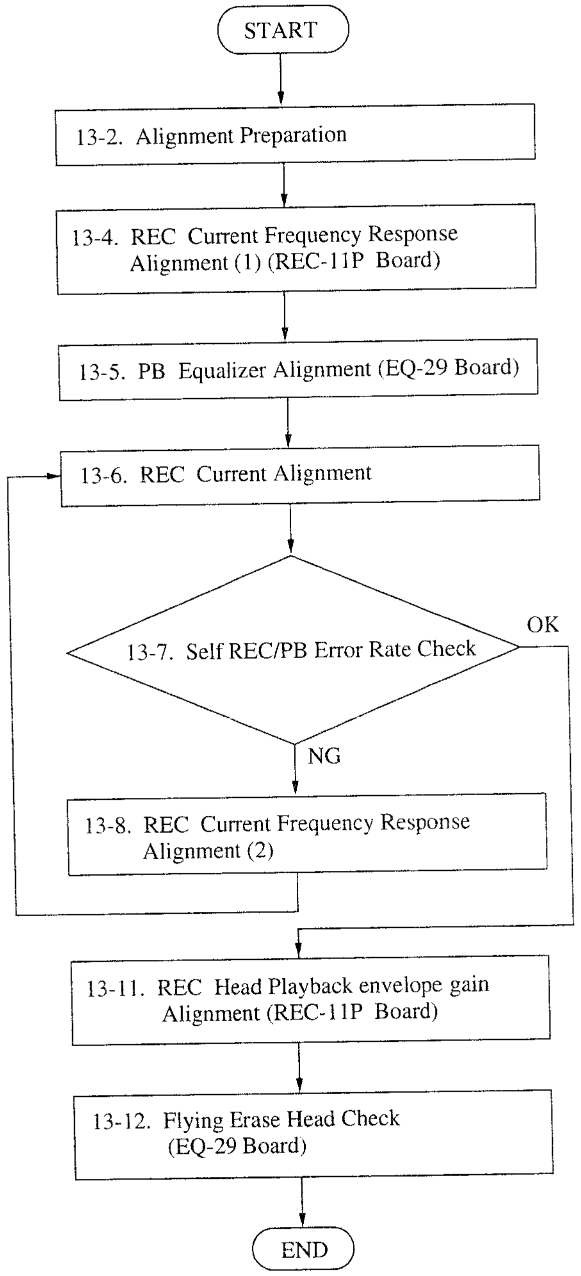
This is the over-all flow chart that is required when a circuit board is replaced, etc.


START
13-2. Alignment Preparation
13-3. REC Current Secondary Distortion Alignment (REC-11P Board)
13-4. REC Current Frequency Response Alignment (1) (REC-11P Board)
※ 13-5. PB Equalizer Alignment (EQ-29 Board)
(※) 13-6. REC Current Alignment
※ 13-7. Self REC/PB Error Rate Check
OK
NG
(※) 13-8. REC Current Frequency Response Alignment (2)
※ 13-9. RF Envelope Offset Alignment (EQ-29 Board)
※ 13-10. PLL Alignment (EQ-29 Board)
13-11. REC Head Playback envelope gain Alignment (REC-11P Board)
END

※ marks indicate alignment required when only EQ-29 board is replaced.

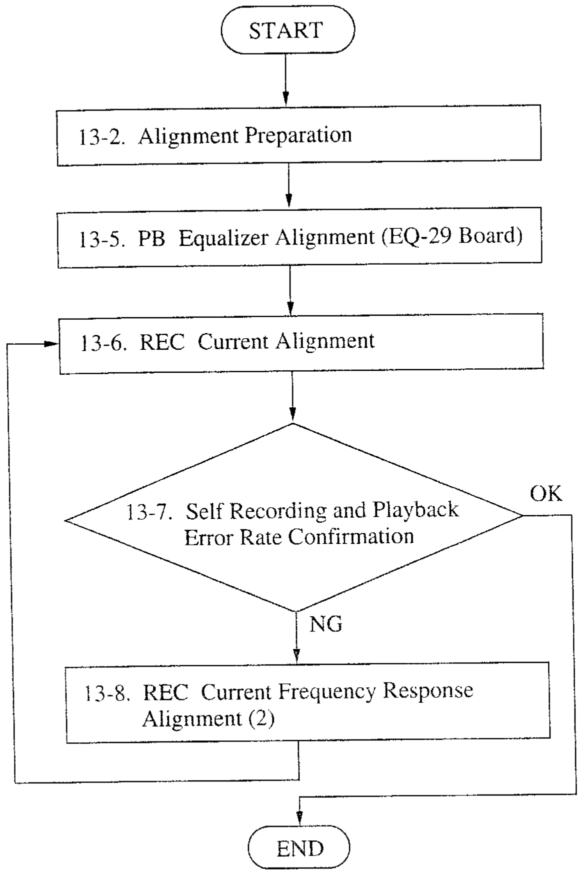
[Alignment Flowchart (2)]

This is the alignment procedure when head drum is replaced.


START
13-2. Alignment Preparation
13-4. REC Current Frequency Response Alignment (1) (REC-11P Board)
13-5. PB Equalizer Alignment (EQ-29 Board)
13-6. REC Current Alignment
13-7. Self REC/PB Error Rate Check
OK
NG
13-8. REC Current Frequency Response Alignment (2)
13-11. REC Head Playback envelope gain Alignment (REC-11P Board)
13-12. Flying Erase Head Check (EQ-29 Board)
END

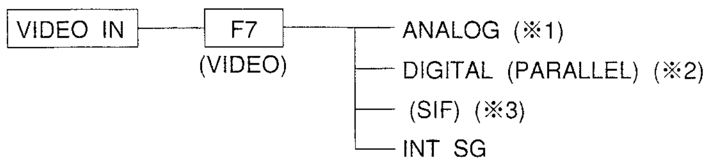
[Alignment Flowchart (3)]

This is the alignment procedure of record/playback of system in normal use of alignment, without head drum replacement.
(Re-alignment necessitated with normal head wear.)
Please make the following alignment every 500 hours of HEAD HOUR.

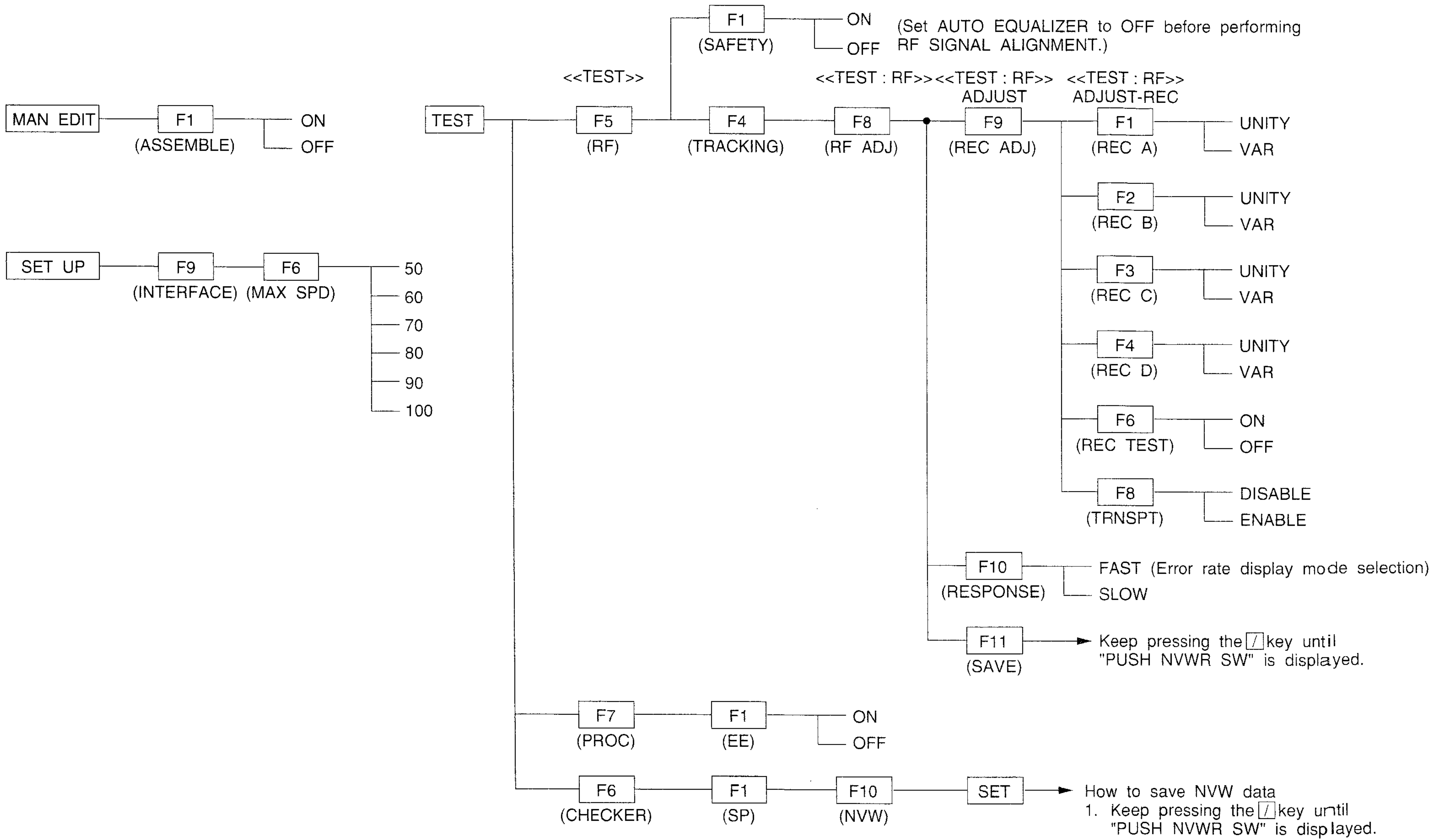

START
13-2. Alignment Preparation
13-5. PB Equalizer Alignment (EQ-29 Board)
13-6. REC Current Alignment
13-7. Self Recording and Playback Error Rate Confirmation
OK
NG
13-8. REC Current Frequency Response Alignment (2)
END

[Control panel setting]

BKDV-101


VIDEO IN
F7
(VIDEO)
ANALOG (※1)
DIGITAL (PARALLEL) (※2)
(SIF) (※3)
INT SG

(※1) In DVR-C20, ANALOG cannot be selected.
(※2) Indications in parentheses can be selected only when BKDV-105/106/205/206 is inserted.
(※3) Indications in parentheses can be selected only when BKDV-105/106/205/206 is inserted.
BKDV-105 : Corresponds to DVR-28.
BKDV-106 : Corresponds to DVR-28P.
BKDV-205 : Corresponds to DVR-20/C20.
BKDV-206 : Corresponds to DVR-20P/C20P.


MAN EDIT
F1
(ASSEMBLE)
ON
OFF
SET UP
F9
(INTERFACE)
F6
(MAX SPD)
50
60
70
80
90
100
TEST
<<TEST>>
F5
(RF)
F1
(SAFETY)
ON
OFF
F4
(TRACKING)
<<TEST : RF>>
F8
(RF ADJ)
<<TEST : RF>>
ADJUST
F9
(REC ADJ)
<<TEST : RF>>
ADJUST-REC
F1
(REC A)
UNITY
VAR
F2
(REC B)
UNITY
VAR
F3
(REC C)
UNITY
VAR
F4
(REC D)
UNITY
VAR
F6
(REC TEST)
ON
OFF
F8
(TRNSPT)
DISABLE
ENABLE
F10
(RESPONSE)
FAST
SLOW
F11
(SAVE)
F7
(PROC)
F1
(EE)
ON
OFF
F6
(CHECKER)
F1
(SP)
F10
(NVW)
SET

(Set AUTO EQUALIZER to OFF before performing RF SIGNAL ALIGNMENT.)

FAST (Error rate display mode selection)

Keep pressing the ⧄ key until "PUSH NVWR SW" is displayed.

How to save NVW data
1. Keep pressing the ⧄ key until "PUSH NVWR SW" is displayed.
2. When "PUSH NVWR SW" is displayed;
DVR-20/C20 : Press S71/SP-15 (A16).
DVR-28 : Press S71/SSP-07 (A11).

13-2. ALIGNMENT PREPARATION

**Set AUTO EQUALIZER to OFF before performing RF SIGNAL ALIGNMENT.
(See page 13-2 and 13-4.)**

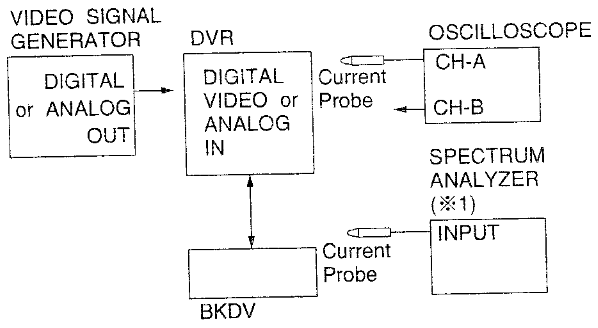
[Equipment Required]

- Oscilloscope (Equivalent: 2445 or 2465/Tektronix)
- Spectrum analyzer (Equivalent: 8568B/Hewlett Packard)
- Current probe (Equivalent: P6022/Tektronix)
- Video signal generator (Equivalent: 1410 or TSG170D/Tektronix)
- Recording current check cable Sony part number: 1-940-823-11
  This cable is supplied with the replacement drum assembly.
- Tape to be used for NVW gain alignment and shuttle check.
  (DVR-28P: The tape in which MOD RAMP is recorded for about 30 minutes around the middle of the L cassette tape)
  (DVR-20P/C20P: The tape in which MOD RAMP is recorded for about 30 minutes around the middle of the M cassette tape)
- Tape to be used for PLL lock reset confirmation.
  (Tape in which the recorded section and the unrecorded section are created alternately, each for about 20 seconds)
- Extension Board EX-185 (For EQ-29 adjustment)
- Extension Board EX-241 (For REC-11 adjustment)
- Blank Tape
- Aignment Tape ER5-2 PAL

Notes 1: An oscilloscope having a frequency band of 150 MHz or more, such as those mentioned above, must be used.
If an oscilloscope having a narrower band width is used, the frequency response alignment of the recording current will become incorrect adjusted properly.
Also, a current probe having a band width of 100 MHz or more must be used.

Notes 2: Timer display: 0 to 10 minutes of the ER5-2 PAL alignment tape must be not used for DVR-20P/C20P/28P.

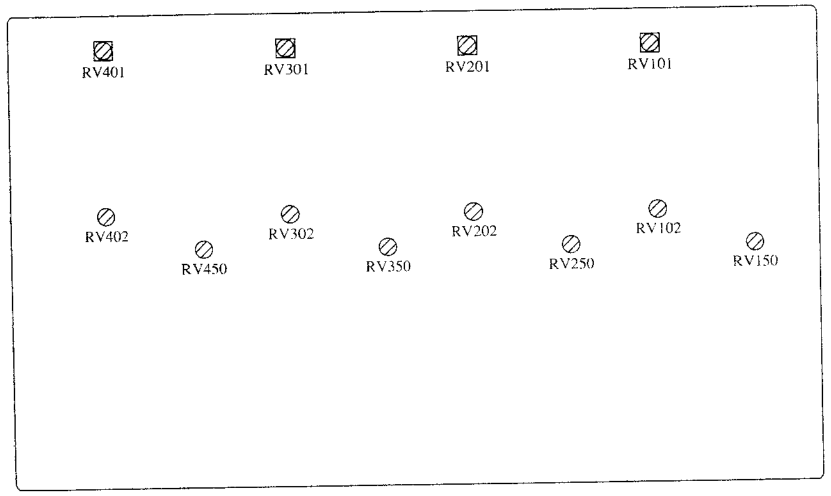
[Equipment Connection]


VIDEO SIGNAL GENERATOR
DIGITAL or ANALOG OUT
DVR
DIGITAL VIDEO or ANALOG IN
Current Probe
OSCILLOSCOPE
CH-A
CH-B
SPECTRUM ANALYZER (※1)
INPUT
Current Probe
BKDV

※1: It is used in Section 13-3. If it is not available, an oscilloscope can be used instead.

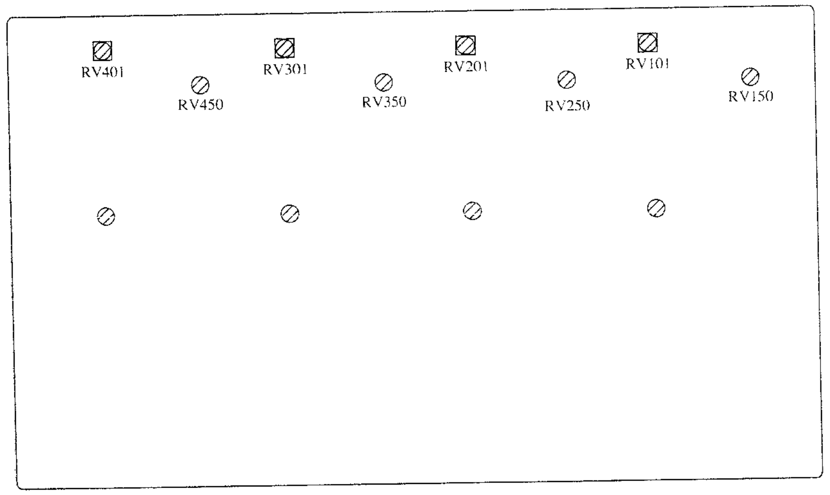
[Location]

The suffix number of REC-11 Board is 11.


RV401
RV301
RV201
RV101
RV402
RV450
RV302
RV350
RV202
RV250
RV102
RV150

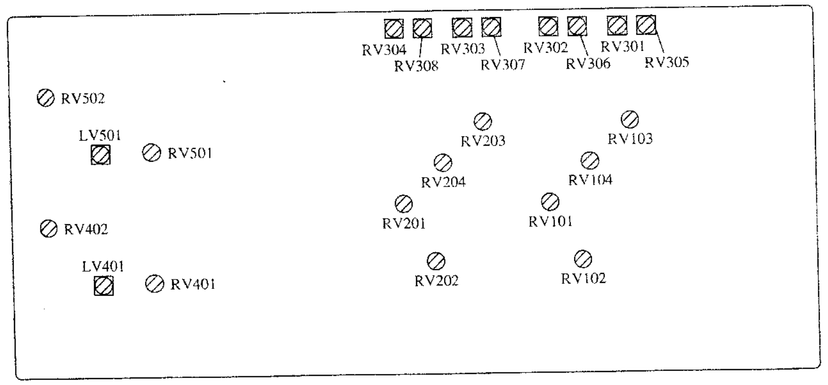
A SIDE

The suffix number of REC-11 Board is 12.


RV401
RV450
RV301
RV350
RV201
RV250
RV101
RV150

A SIDE

EQ-22 Board

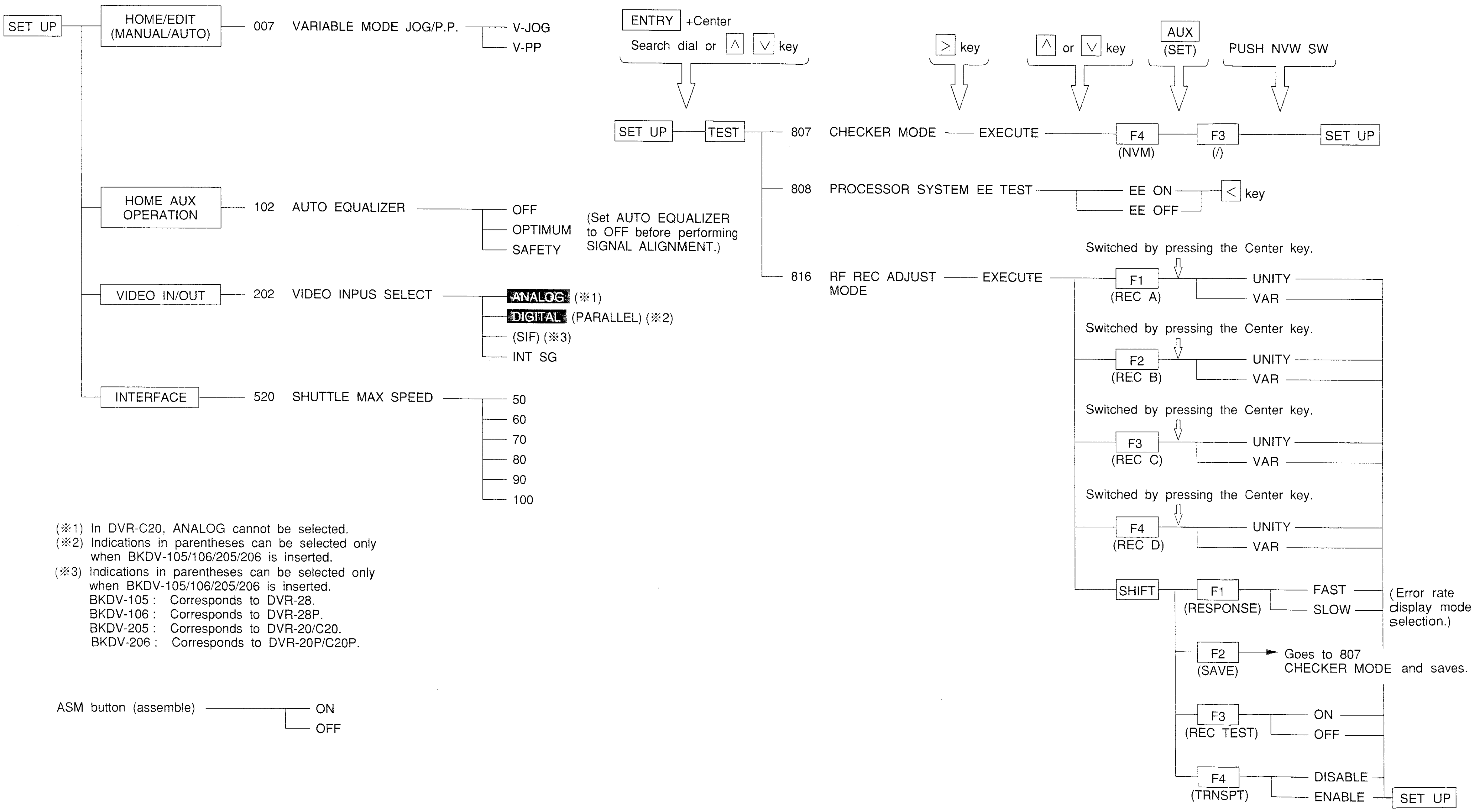

RV304
RV308
RV303
RV307
RV302
RV306
RV301
RV305
RV502
LV501
RV501
RV203
RV103
RV204
RV104
RV201
RV101
RV402
LV401
RV401
RV202
RV102

A SIDE

[Control panel setting]

▨ : Indications when selecting the initial settings

BKDV-201/200


SET UP
HOME/EDIT (MANUAL/AUTO)
007 VARIABLE MODE JOG/P.P.
V-JOG
V-PP
HOME AUX OPERATION
102 AUTO EQUALIZER
OFF
OPTIMUM
SAFETY
(Set AUTO EQUALIZER to OFF before performing SIGNAL ALIGNMENT.)
VIDEO IN/OUT
202 VIDEO INPUS SELECT
ANALOG (※1)
DIGITAL (PARALLEL) (※2)
(SIF) (※3)
INT SG
INTERFACE
520 SHUTTLE MAX SPEED
50
60
70
80
90
100
ENTRY +Center
Search dial or ∧ ∨ key
> key
∧ or ∨ key
AUX (SET)
PUSH NVW SW
SET UP
TEST
807 CHECKER MODE
EXECUTE
F4 (NVM)
F3 (/)
SET UP
808 PROCESSOR SYSTEM EE TEST
EE ON
EE OFF
< key
Switched by pressing the Center key.
816 RF REC ADJUST MODE
EXECUTE
F1 (REC A)
UNITY
VAR
Switched by pressing the Center key.
F2 (REC B)
UNITY
VAR
Switched by pressing the Center key.
F3 (REC C)
UNITY
VAR
Switched by pressing the Center key.
F4 (REC D)
UNITY
VAR
SHIFT
F1 (RESPONSE)
FAST
SLOW
(Error rate display mode selection.)
F2 (SAVE)
Goes to 807 CHECKER MODE and saves.
F3 (REC TEST)
ON
OFF
F4 (TRNSPT)
DISABLE
ENABLE
SET UP
ASM button (assemble)
ON
OFF

(※1) In DVR-C20, ANALOG cannot be selected.

(※2) Indications in parentheses can be selected only when BKDV-105/106/205/206 is inserted.

(※3) Indications in parentheses can be selected only when BKDV-105/106/205/206 is inserted.

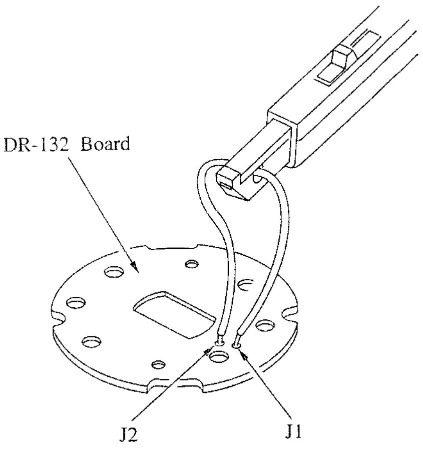
BKDV-105 : Corresponds to DVR-28.
BKDV-106 : Corresponds to DVR-28P.
BKDV-205 : Corresponds to DVR-20/C20.
BKDV-206 : Corresponds to DVR-20P/C20P.

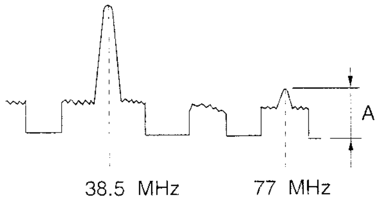
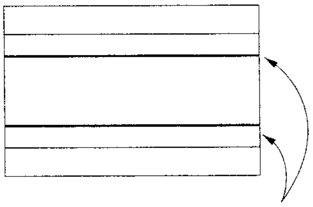
13-3. REC CURRENT SECONDARY DISTORTION ALIGNMENT (REC-11P Board)

This alignment is completed when shipped. You only carry out this alignment it you repair the board.

- This alignment is made for reducing the harmonic distortion of the recording current.

Note: For this alignment, an oscilloscope having a band width of 150 MHz or more and a current probe having a band width of 100 MHz or more must be used.

<table>
<tr><th>Conditions for alignment</th><th>Specifications</th><th>Adjustments</th></tr>
<tr><td colspan="3">• Connection: Same as in Section 13-2
• VTR: REC TEST
(Enforcement REC mode)
• Input signal: Any signal
• Switch/Jumper settings:
S4-3/EN-99 (A23): ON
S4-4/EN-99 (A23): OFF
• Control panel settings: Same as in Section 13-2.</td></tr>
<tr><td colspan="3">STEP 1.
(1) Eject the cassette tape and turn the power off.
(2) Remove the top plate. (See Section 2-4.)
(3) Execute Steps 1 through 2 in Section 6-4 and remove the brush slip ring assembly.
(4) Remove the soldering bridges W1, W2, W3, and W4 from the DR-132 board.</td></tr>
<tr><td colspan="3">STEP 2.
(1) In REC ADJ mode, set TRNSPT to DISABLE.
(2) Set REC CURRENT of REC-A to "VAR."</td></tr>
<tr><td colspan="3">STEP 3.
• Short-circuit between J1 and J2 on DR-132 board by inserting the recording current check cable. Then, pinch the cable with a current probe.

 </td></tr>
</table>

Conditions for alignment	Specifications	Adjustments
STEP 4. Set into REC mode forcibly. • Spectrum Analyzer • Oscilloscope	When the spectrum analyzer is available: J1-J2／DR-132  Spec. : A=Minimum (77 MHz level) When an oscilloscope is available: J1-J2／DR-132  Observe the waveform by compressing the time base scale of the oscilloscope as much as possible. **Spec.:** Make the alignment so that the upper and lower luminescent lines trace on the oscilloscope are symmetrical and the luminescent lines can be observed as clear as possible.	⊘RV102/REC-11P (E2) (CH-A alignment)

STEP 5.

- Same as Steps 3 and 4, short-circuit between J3 and J4 (CH-B), between J5 and J6 (CH-C), and between J7 and J8 (CH-D), and then align the recording current secondary distortion of each channel.

Note: When the recording current check cable are attempted to be connected or disconnected, be sure to cancel once the enforced REC mode. After connection, establish the enforced REC mode, again.

CHANNEL	MEASUREMENT POINT	ADJUSTMENT POINT
CH-B	J3-J4/DR-132	⊘RV302/REC-11P (D2)
CH-C	J5-J6/DR-132	⊘RV202/REC-11P (C2)
CH-D	J7-J8/DR-132	⊘RV402/REC-11P (B2)

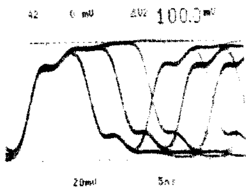
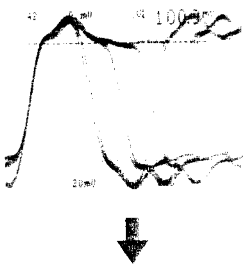
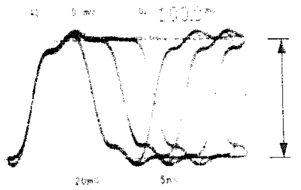
STEP 6.
Perform all the alignment items in Flowchart (2).

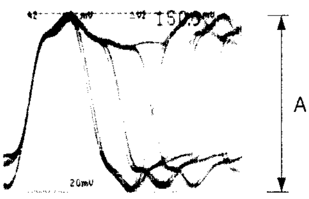
STEP 7.
Cancel the enforcement REC mode.

13-4. REC CURRENT FREQUENCY RESPONSE ALIGNMENT (1) (REC-11P Board)

- This alignment is made for matching the frequency response of the recording current to the standard response.
- This alignment must be made when the intermediate drum assembly or REC-11P board is replaced.
- When the alignment is turned clockwise, the high-frequency component of the recording current is emphasized.

Note: For this alignment, an oscilloscope having a band width of 150 MHz or more and a current probe having a band width of 100 MHz or more must be used.

Conditions for alignment	Specifications	Adjustments
• Connection: Same as in Section 13-2 • VTR: REC TEST (Enforced REC mode) • Input signal: Modulated lamp signal • Control panel settings: Same as in Section 13-2		
STEP 1. • Execute Steps 1, 2, and 3 of Section 13-3.		
STEP2. • Short-circuit between J1 and J2 on the DR-132 board by inserting the recording current check cable. Then, pinch the cable with a current probe. (See Step 3 in Section 13-3.)		
STEP 3. Set to enforced REC mode. • Oscilloscope AC 20 mV/DIV 5 nS/DIV	J1-J2/DR-132 (CH-A) NG  The control was turned counterclockwise excessively. NG  The control was turned clockwise excessively. OK  100±5 mA After the completion of alignment, confirm again that there is no change in waveform. If the specification is not satisfied, make alignments by turning ⊘ RV101/REC-11P (E1) again.	⊘ RV101/REC-11P (E1) (CH-A recording current frequency response coarse alignment) • Make alignment by turning ⊘ RV101 so that waveform OK as shown is obtained and satisfied. ⊘ Control knob (BKDV-101) Search dial (BKDV-200/201) • Align the recording current level by the ⊘ control knob so that the specification is satisfied.

Conditions for alignment	Specifications	Adjustments
STEP 4. • Oscilloscope AC 20 mV/DIV 10 mS/DIV	 Spec. : A=150±5 mA	⊘ RV101/REC-11P (E1) (CH-A recording current frequency response alignment) • Make an alignment by turning ⊘ RV101 clockwise so that the specification is satisfied.

STEP 5.
(CH-B/C/D recording current frequency response alignment)

- Same as Steps 2, 3, and 4, short-circuit between J3 and J4 (CH-B), between J5 and J6 (CH-C), and between J7 and J8 (CH-D), and then align the recording current waveform and the recording current of each channel.

Note: When the recording current check cable are attempted to be connected or disconnected, be sure to cancel once the enforced REC mode. After connection, establish the enforced REC mode, again.

CHANNEL	MEASUREMENT POINT	ADJUSTMENT POINT
CH-B	J3-J4/DR-132	⊘ RV301/REC-11P (C1), adjusting knob
CH-C	J5-J6/DR-132	⊘ RV201/REC-11P (D1), adjusting knob
CH-D	J7-J8/DR-132	⊘ RV401/REC-11P (B1), adjusting knob

STEP 6. (Saving the control data)
Save the REC current data.
(How to save)
(1) Keep pressing the / key until the "PUSH NVWR SW" is displayed.
(2) DVR-20P/C20P: Press S71/SP-15 (A16) and confirm that "READY" is displayed on the control panel.
DVR-28P: Press S71/SSP-07 (A11) and confirm that "READY" is displayed on the control panel.

STEP 7.

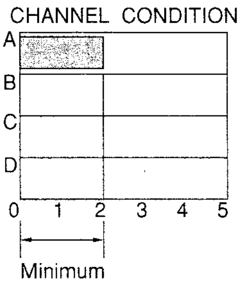
- Turn the power off.
- Remove the recording current check cable from DR-132 board.
- Short-circuit the soldering bridges W1, W2, W3, and W4.

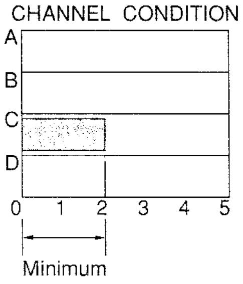
STEP 8.
Execute Steps 12 through 19 of Section 6-4.

13-5. PB EQUALIZER ALIGNMENT (EQ-29 Board)

- Attempt this alignment from STEP 1 only when EQ-29 board is replaced and not aligned from STEP 1. Except those cases, start alignment from STEP 5.
- This alignment is made for matching the frequency responses of the phase and gain in the playback equalizing system to the standard response.
- RV301 to RV304 are used for the gain alignment. When they are turned clockwise, the gain of the low-frequency component increases.
- RV305 to RV308 are used for the phase alignment. When they are turned clockwise, the phase of the low-frequency component is delayed.

Conditions for alignment	Specifications	Adjustments
STEP 1. • Connection: Same as in Section 13-2. • VTR: STOP • Input signal: Modulated lamp signal • Switch/Jumper settings: S2/PR-163 (A6): OFF • Control panel settings: Same as in Section 13-2 • Oscilloscope DC 0.5 V/DIV 5 mS/DIV	TP403/EQ-29 (A3) 1.20±0.05 Vdc TP503/EQ-29 (A2) 1.20±0.05 Vdc	⊘ RV401/EQ-29 (A3) ⊘ RV501/EQ-29 (A2) (Standard voltage alignment)
STEP 2. VTR: SYSTEM EE • Oscilloscope DC 0.5 V/DIV 5 mS/DIV	TP401/EQ-29 (A3) 1.20±0.05 Vdc TP501/EQ-29 (A2) 1.20±0.05 Vdc	⊘ LV401/EQ-29 (A3) ⊘ LV501/EQ-29 (A2) (VCO characteristic alignment)
STEP 3. • Remove connectors CN451, CN452, CN453, and CN454 from REC-11P board. • Insert a self recording tape. • VTR: REC • Oscilloscope DC 0.5 V/DIV 5 mS/DIV	TP401/EQ-29 (A3) 1.20±0.1 Vdc TP501/EQ-29 (A2) 1.20±0.1 Vdc	⊘ RV402/EQ-29 (A3) ⊘ RV502/EQ-29 (A2) (Clock duty alignment) • After the completion of alignment, connect CN451, CN452, CN453, and CN454.
STEP 4. (NVW coarse alignment) (1) Select the checker mode on the test menu. (2) Set the addresses of A8E8, A8E9, A8EA, A8EB, A8EC, and A8ED to 80H. Procedure: Refer to Step 3 and after in Section 2-12 "SYNC PHASE and SC PHASE User Settings."		

<table>
<tr><th>Conditions for alignment</th><th>Specifications</th><th>Adjustments</th></tr>
<tr><td>STEP 5.
• Connection: Same as in Section 13-2
• VTR: PLAY
• Input signal (VIDEO IN): Any signal
• Switch/Jumper settings:
S2/DE-36 (A6): OFF
• Control panel settings: Same as in Section 13-2
• Playback the modulated lamp section (TIME CODE for 10 to 20 minutes) of the ER5-2 PAL alignment tape.</td><td>

Spec. : CHANNEL CONDITION≦2.0
Align the CHANNEL CONDITION level of CH-A so that it is minimum.
Note: If it is difficult to find the minimum point because the range of the CHANNEL CONDITION display around zero is wide, align the CHANNEL CONDITION level so that it comes to around the middle of the range.</td><td>⊘ RV301/EQ-29 (D1)
⊘ RV305/EQ-29 (D1)
(CH-A EQ alignment)</td></tr>
<tr><td>STEP 6.</td><td>

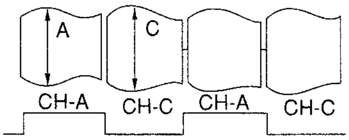
Spec. : CHANNEL CONDITION≦2.0
Align the CHANNEL CONDITION level of CH-C so that it is minimum.</td><td>⊘ RV302/EQ-29 (D1)
⊘ RV306/EQ-29 (D1)
(CH-C EQ alignment)</td></tr>
<tr><td>STEP 7.
(CH-B/D alignment)</td><td colspan="2">Align CH-B and CH-D same as the alignment of CH-A and CH-C in Steps 5 and 6. Adjustment points are as follows.
<table>
<tr><th>CHANNEL</th><th>ADJUSTMENT POINT</th></tr>
<tr><td>CH-B</td><td>⊘ RV303/EQ-29 (C1)
⊘ RV307/EQ-29 (C1)</td></tr>
<tr><td>CH-D</td><td>⊘ RV304/EQ-29 (C1)
⊘ RV308/EQ-29 (C1)</td></tr>
</table></td></tr>
<tr><td>STEP 8.
• S2/DE-37 (A6): ON</td><td></td><td></td></tr>
</table>

13-6. REC CURRENT ALIGNMENT

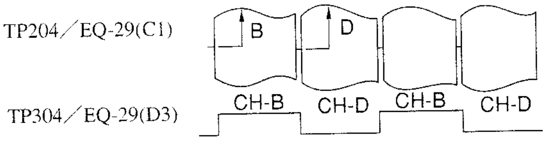
- The optimum magnetizing FLUX level for recording on a tape can be obtained by making this alignment.
- When the hexadecimal data value on the control panel becomes smaller, the recording current value increases. The data after alignment vary by the characteristics of each recording head. (If there is a deviation in this alignment value, the overwrite performance may deteriorate.)
  This alignment aims to match the envelope level of self record/playback with that of reference recording of reference tape. regardless of the absolute value of data.
  When the alignment is made within the range of 00 and 3F, the alignment is normal.

Conditions for alignment	Specifications	Adjustments
• Connection: Same as in Section 13-2 • VTR: PB and REC (CONF) • Input signal (VIDEO IN): Modulated lamp signal • Switch/Jumper settings: S2/DE-36 (A6): OFF • Control panel settings: Same as in Section 13-2.		

13-6-1. CH-A and CH-C REC Current Alignment

Conditions for alignment	Specifications	Adjustments
STEP 1. • Playback the CH-A and CH-C recorded sections (Timer display: 10 to 20 minutes) of the ER5-2 PAL alignment tape. • Oscilloscope AC 50 mV/DIV 2 mS/DIV MODE: 20 MHz BW LIMIT	TP104／EQ-29(C1) TP304／EQ-29(D3)  Measure the CH-A and CH-C envelope peak levels. In the measurement the frequency response of the oscilloscope must be limited to 20 MHz. **Note:** If the envelope level value fluctuates, the peak value must be measured.	
STEP 2. Remove CN453 and CN454 from REC-11P board.		
STEP 3. Set to REC mode in the unrecorded section (Timer display: 25 minutes or after) of the ER5-2 PAL alignment tape. **Note:** Never establish REC mode in the sections before 25 minutes of the ER5-2 PAL displayed on the timer.		
STEP 4. • Set REC-A of REC CURRENT to "VAR." • When REC-C is aligned, set REC-C to "VAR." • Oscilloscope AC 50 mV/DIV 2 mS/DIV	Deviation between the ER5-2 playback envelope level in Step 2 and the self recording / playback envelope level should be ≦5% **Note:** If the envelope level value fluctuates, the peak value must be measured.	⊘ Control knob/ Function control panel
STEP 5. Connect CN453 and CN454 to REC-11P board.		

13-6-2. CH-B and CH-D REC Current Alignment

Conditions for alignment	Specifications	Adjustments
STEP 1. • Playback the CH-B and CH-D recorded sections (Timer display: 10 to 20 minutes) of the ER5-2 PAL alignment tape. • Oscilloscope 50 mV/DIV 2 mS/DIV MODE: 20 MHz BW LIMIT	 TP204／EQ-29(C1) B D TP304／EQ-29(D3) CH-B CH-D CH-B CH-D Measure the CH-B and CH-D envelope peak levels. In this measurement, the frequency response of the oscilloscope must be limited to 20 MHz. **Note:** If the envelope level value fluctuates, the peak value must be measured.	
STEP 2. Remove CN451 and CN452 from REC-11P board.		
STEP 3. Set to REC mode in the unrecorded section (Timer display: 25 minutes or after) of the ER5-2 PAL alignment tape. **Note: Never establish REC mode in the sections before 25 minutes of the ER5-2 PAL displayed on the timer.**		
STEP 4. • Set REC-B of REC CURRENT to "VAR." • When REC-D is aligned, set REC-D to "VAR." • Oscilloscope 50 mV/DIV 2 mS/DIV	Deviation between the ER5-2 playback envelope level in Step 2 and the self recording and playback envelope level should be≦5% **Note: If the envelope level value fluctuates, the peak value must be measured.**	❷ Control knob (BKDV-101) Search dial (BKDV-200/201) Function control panel
STEP 5. Connect CN451 and CN452 to REC-11P board.		

13-6-3. Saving the Control Data

Conditions for alignment	Specifications	Adjustments
Save the control data. (How to save) (1) Keep pressing the / key until "PUSH NVWR SW" is displayed. (2) DVR-20P/C20P: Press S71/SP-15 (A16) and confirm that "READY" is displayed on the control panel. DVR-28P: Press S71/SSP-07 (A11) and confirm that "READY' is displayed on the control panel. (3) Return the indications of REC-A to REC-D to UNITY.		
• S2/DE-37 (A6): ON		

13-7. SELF RECORDING/PLAYBACK ERROR RATE CONFIRMATION

- This is executed to confirm that the aligned recording characteristics are interchangeable with the standard tape and the good alignment results are obtained.
- Some heads may require the recording current frequency response alignment (2).

Conditions for alignment	Specifications	Adjustments
• Connection: Same as in Section 13-2 • VTR: REC→INSERT→PLAY • Input signal: Modulated lamp signal • Switch/Jumper settings: S2/DE-36 (A6): OFF • Control panel settings: Same as in Section 13-2		
(1) • Turn the power on and record the modulated lamp signal for two minutes. • Set both VTRs of VIDEO and AUDIO to insert mode and overwrite on the recorded section: Confirm that the CHANNEL CONDITION level satisfies the specification.		
(2) Set the function display to "SLOW."	**Spec.:** The CHANNEL CONDITION level of each channel must be less than 2.0. If the specification is not satisfied, make alignments in Section 13-8.	
(3) Play back the overwritten section again and confirm that the CHANNEL CONDITION level satisfies the specification.		

13-8. REC CURRENT FREQUENCY RESPONSE ALIGNMENT (2)

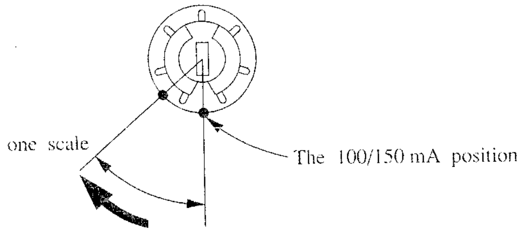
- This alignment is to compensate for frequency response of the recording current characteristics and to match the recording magnetization characteristics on the tape to the that of the reference recording of reference tape.
- Replacement of the head or the use of worn head may require this compensation. It can be checked by following Section 13-7 whether or not the compensation is required.

Conditions for alignment	Specifications	Adjustments

- Connection: Same as in Section 13-2
- VTR: REC→INSERT→PLAY
- Input signal (VIDEO IN): Modulated lamp signal
- Switch/Jumper settings: S2/DE-36: OFF
- Control panel settings: Same as in Section 13-2

(1) • Turn the power on and record the modulated lamp signal for two minutes.
    • Set both VTRs of VIDEO and AUDIO in insert mode and execute insert from the begining of the recorded section.
(2) Set the function display to "FAST."
(3) Align the CHANNEL CONDITION level by turning ⊘ RV (See the following table) corresponding to the channel to be aligned so that the CHANNEL CONDITIONs are optimum.

CHANNEL	ADJUSTMENT POINT (⊘ RV)
CH-A	RV101/REC-11P/ (D1)
CH-B	RV301/REC-11P/ (B1)
CH-C	RV201/REC-11P/ (C1)
CH-D	RV401/REC-11P/ (A1)

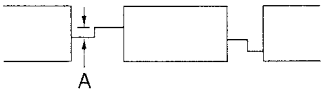
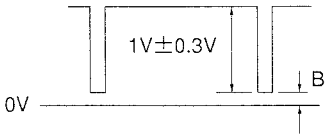
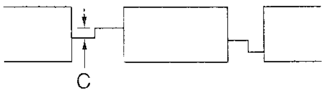
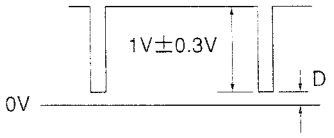


Note 1: The ⊘RV (control) must be turned clockwise from the 100/150 mA position that was aligned in the Recording Current Frequency Response Alignment (1) and within a range of one scale. However, in the Flowchart (3) (every 300 hours), the 100/150 mA position might change due to the head wear. Then proceed first to the Recording Current Frequency Response Alignment (1) using a current probe.

Note 2: When this alignment is attempted, the alignment in Section 13-6 and the confirmation in Section 13-7 must be done, too.

13-9. RF ENVELOPE OFFSET ALIGNMENT (EQ-29 Board)

- This alignment is made to eliminate the DC OFFSET in the RF envelope output signal. This alignment has already been made before shipping. Therefore, this alignment is usually not required unless any incorrect output is found in the WFM output envelope.

Conditions for alignment	Specifications	Adjustments
STEP 1. • Connection: Same as in Section 13-2 • VTR: PLAY (Playback of the alignment tape) • Control panel settings: Same as in Section 13-2 • Oscilloscope AC 100 mV/DIV 2 mS/DIV	TP101/EQ-29 (D1)  A=0±10 mV	⊘ RV103/EQ-29 (D1) (CH-A/C Alignment)
STEP 2. VTR: PLAY (Playback of the alignment tape) • Oscilloscope AC 200 mV/DIV 1 mS/DIV	CN401-3C/EQ-29 (B3)  B=0±50 mV	⊘ RV102/EQ-29 (D2) (CH-A/C Alignment)
STEP 3. VTR: PLAY (Playback of the alignment tape) • Oscilloscope AC 100 mV/DIV 2 mS/DIV	TP201/EQ-29 (C1)  C=0±10 mV	⊘ RV203/EQ-29 (C1) (CH-B/D Alignment)
STEP 4. VTR: PLAY (Playback of the alignment tape) • Oscilloscope AC 200 mV/DIV 1 mS/DIV	CN401-2C/EQ-29 (B3)  D=0±50 mV	⊘ RV202/EQ-29 (C2) (CH-B/D Alignment)

13-10. PLL ALIGNMENT (EQ-29 Board)

- This alignment is to controll the FREE RUN frequency of VCO to the specified frequency in accordance with respective mode of VTR. This alignment already has been made before shipping and no influence is given by the head replacement. Therefore, this alignment is not required in most cases except special cases, such as the replacement of EQ board.

Conditions for alignment	Specifications		Adjustments
STEP 1. • Connection: Same as in Section 13-2. • VTR: STOP • Input signal: Modulated lamp signal • Switch/Jumper setting: S2/PR-163 (A6): OFF • Control panel setting: Same as in Section 13-2 • Oscilloscope DC 0.5 V/DIV 5 mS/DIV	TP403/EQ-29 (A3) TP503/EQ-29 (A2)	1.20±0.05 Vdc 1.20±0.05 Vdc	⊘ RV401/EQ-29 (A3) RV501/EQ-29 (A2) (Reference voltage alignment)
STEP 2. VTR: SYSTEM EE • Oscilloscope DC 0.5 V/DIV 5 mS/DIV	TP401/EQ-29 (A3) TP501/EQ-29 (A3)	1.20±0.05 Vdc 1.20±0.05 Vdc	⊘ LV401/EQ-29 (A3) ⊘ LV501/EQ-29 (A2) (VCO characteristic alignment)
STEP 3. • Remove connectors CN451, CN452, CN453, and CN454 from REC-11P board. • Insert a self recording tape. • VTR: REC • Oscilloscope DC 0.5 V/DIV 5 mS/DIV	TP401/EQ-29 (A3) TP501/EQ-29 (A2)	1.20±0.01 Vdc 1.20±0.01 Vdc	⊘ RV402/EQ-29 (A3) ⊘ RV502/EQ-29 (A2) (Clock duty alignment) • After the completion of alignment, connect CN451, CN452, CN453, and CN454.
STEP 4. (NVW tentative alignment) (1) Select the checker mode of the test menu. (2) Set the addresses of A8E8, A8E9, A8EA, A8EB, A8EC, and A8ED to 80H. Procedure: Refer to Step 3 and after in Section 2-12 "SYNC PHASE and SC PHASE User Settings."			

<table>
<tr><th>Conditions for alignment</th><th>Specifications</th><th>Adjustments</th></tr>
<tr><td>STEP 5.
(NVW A/C channel alignment)
• Insert a NVW gain alignment tape.
• Remove connectors CN463 and CN464 from EQ-29 board.

• Oscilloscope
ADD INVERT mode
When CH-1 and CH-2 are both set to the GND level, set them so that the trace luminescent line comes to the center.
• Connect TP401 to CH-1 and TP403 to CH-2.</td><td colspan="2">DVR-20P, DVR-C20P and DVR-28P (when BKDV-111 (PP-34P board) is not inserted)
(1) Set the maximum shuttle speed of 100 times.
(2) Set the tape speed to -100 times in the SHUTTLE mode by using around the middle portion (01:00:00 - 02:30:00) of the M cassette tape in which signals are recorded.
(3) Align the A8E8 data to lock PLL and make a fine alignment by pressing the < or > cursor key so that the trace luminescent line comes to the center.
(4) Set the shuttle speed around the middle section of the tape to +100 times in SHUTTLE mode.
(5) Align the A8E9 data to lock PLL and make a fine alignment by pressing the < or > cursor key so that the trace luminescent line comes to the center. Make an alignment by increasing the HEX value so that the trace luminescent line comes to -0.1 V.

DVR-28P (when BKDV-111 (PP-34P board) is inserted)
(1) Set up P PLAY mode and turn the control knob (search dial in BKDV-200/201) while pressing VAR so that it is set at -15%.
(2) Align the A8E8 data to lock PLL (an image will appear on the display) and make a fine alignment by pressing the < or > cursor key so that the luminescent line comes to the center.
(3) Set to P PLAY mode and turn the adjusting knob (search dial in BKDV-200/201) while pressing VAR so that it is set at +10.4%.
(4) Align the A8E9 data to lock PLL and make a fine alignment by pressing the < or > cursor key so that the luminescent line comes to the center.
(5) Set to P PLAY mode and turn the adjusting knob (search dial in BKDV-200/201) while pressing VAR so that it is set at +15%.
(6) Align the A8EA data to lock PLL and make a fine alignment by pressing the < or > cursor key so that the luminescent line comes to the center. Make an alignment by increasing the HEX value so that the luminescent line is set at -0.1 V.

After completion of alignment, connect connectors CN463 and CN464 to EQ-29 board.</td></tr>
<tr><td>STEP 6.
(NVW B/D channel alignment)
The following the numbers of connectors and alignment terminals in Step 5 should be read as follows and then execute the same settings as Step 5.

Connector
CN463 → CN461
CN464 → CN462
Adjustment terminals
TP401 → TP501
TP403 → TP503</td><td colspan="2">The following numbers of address data should be read as follows and make the same alignments as Step 5.

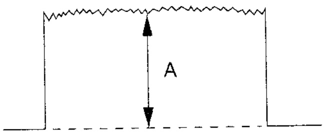
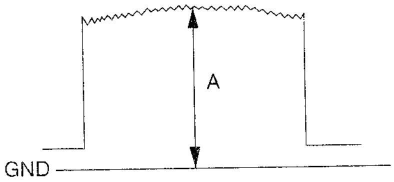
Address data
A8E8 → A8EB
A8E9 → A8EC
A8EA → A8ED</td></tr>
<tr><td colspan="3">Step 7. (NVW SAVE)
Save the PLL alignment data.
VTR: STOP
(How to save)
(1) Keep pressing the / key until "PUSH NVWR SW" is displayed.
(2) DVR-20P/C20P: Press S71/SP-15 (A16) and confirm that 'READY' is displayed on the control panel.
DVR-28P: Press S71/SSP-07 (A11) and confirm that 'READY 'is displayed on the control panel.</td></tr>
<tr><td colspan="3">STEP 8.

DVR-20P, DVR-C20P and DVR-28P (when BKDV-111 (PP-34P board) is not inserted)
(±100 times shuttle alignment)
Confirm that PLL lock will not be unlocked when the tape speed is at ±100 times in around the middle portion of the shuttle confirmation tape.

DVR-28P (when BKDV-111 (PP-34P board) is inserted)
(PLL lock reset confirmation)
(1) Play back the PLL lock reset confirmation tape in programed play mode, and confirm that the PLL lock is reset at +15% or =15%.
(2) S2/PR-163 (A6): Return the switch to ON.</td></tr>
</table>

13-11. REC HEAD PLAYBACK ENVELOPE GAIN ALIGNMENT (REC-11P Board)

- This alignment is to keep the output signal playback envelope of the recording head, and to stabilize automatic tracking. The alignments is required when the drum is replaced.

Conditions for alignment	Specifications	Adjustments
STEP 1. • Connection: Same as in Section 13-2. • Control panel settings: Same as in Section 13-2. • Playback the 4-CH recorded sections (Timer display: 10 to 20 minutes) of the ER5-2 PAL alignment tape. Set the tracking mode to "VAR" to maximum the playback envelope. • Oscilloscope AC 500 mV/DIV 2 mS/DIV	TP103/REC-11P (E1)  Measure the middle of the envelope Spec: MAX	⊘ Tracking control knob/ Function control panel
STEP 2. • Adjust ⊘RV150 so that the maximum envelope signal meets the Spec. • Oscilloscope. AC 500 mV/DIV 2 mS/DIV	TP103/REC-11P (E1)  Measure the middle of the envelope Spec: A=2.0±0.1V	⊘ RV150/REC-11P (E1) (CH-A alignment)

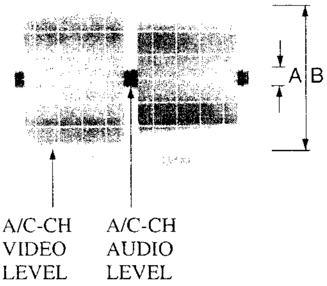
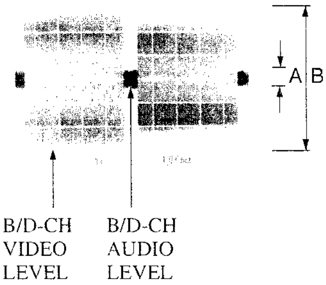
STEP3.

- Align the REC head playback envelope gain of CH-B, CH-C and CH-D same as the alignments of CH-A in Steps 2 and 3.

CHANNEL	MEASUREMENT POINT	ADJUSTMENT POINT
CH-B	TP303/REC-11P (C1)	⊘RV350/REC-11P (C1)
CH-C	TP203/REC-11P (D1)	⊘RV250/REC-11P (D1)
CH-D	TP403/REC-11P (B1)	⊘RV450/REC-11P (B1)

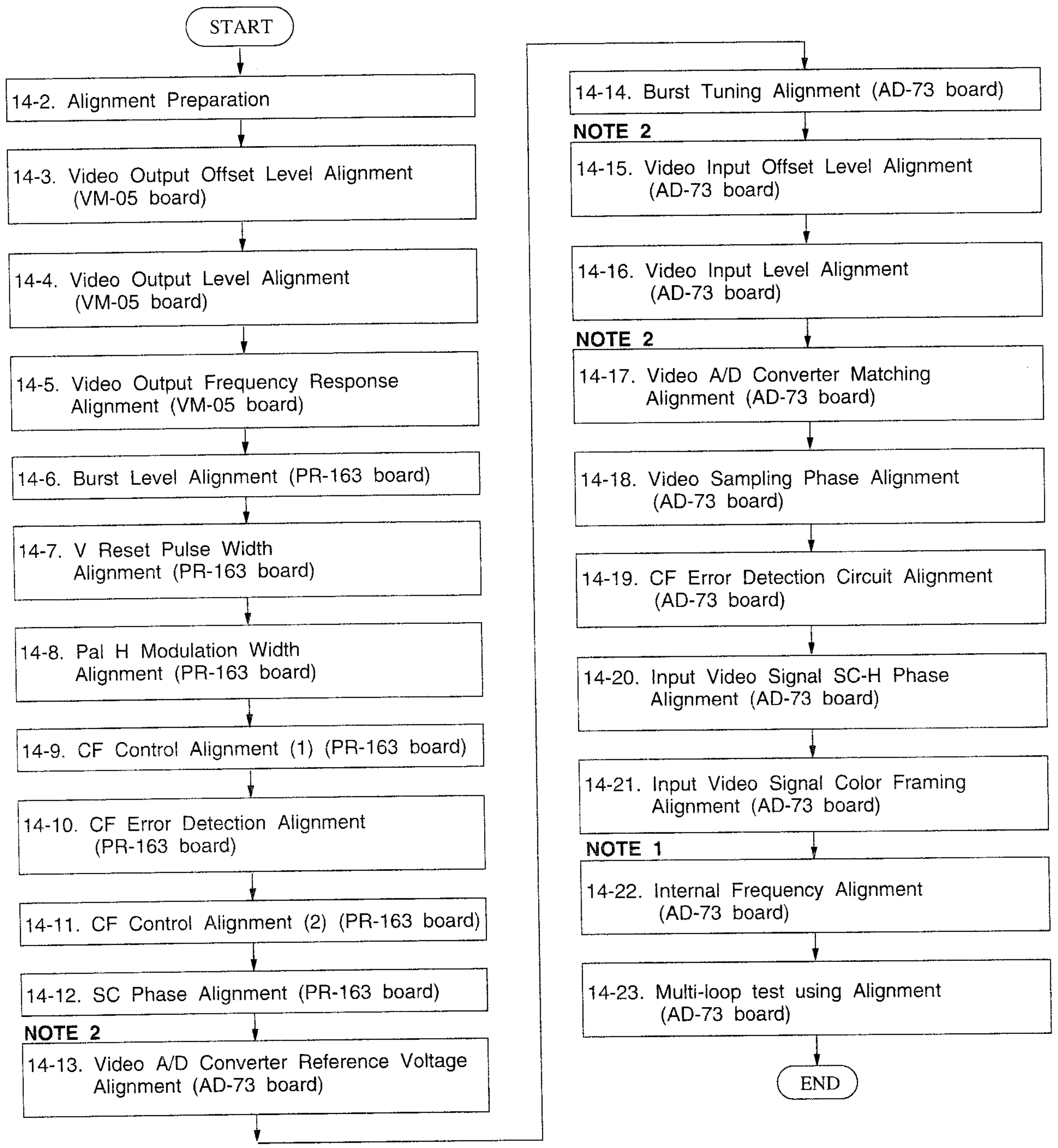
NOTE: The address of RV150, RV250, RV350 and RV450 is the following below when the last two-digit suffix is 11.
⊘RV150/REC-11P (E2)
⊘RV250/REC-11P (D2)
⊘RV350/REC-11P (C2)
⊘RV450/REC-11P (B2)

13-12. FLYING ERASE HEAD CHECK (EQ-29 Board)

Conditions for alignment	Specifications	Adjustments
STEP 1. • Connection: Same as in Section 13-2. • VTR: REC→INSERT→PLAY • Input signal: Free • Control panel settings: VIDEO IN (VIDEO) →INT SG (MOD RAMP) SET UP/AUDIO IN (DA-1)→INT SG (DA-2)→INT SG (DA-3)→INT SG (DA-4)→INT SG • Record for 1 min. on Self Recording Tape • Remove CN451 to CN454 on REC-11P board. • Select DA-1 to DA-4 ch in Manual Edit and make 1 min. recording portion to the insert mode. • Playback the inserted portion. • Oscilloscope AC 100 mV/DIV 1 mS/DIV TRIG: TP304/EQ-29 (B1)	TP104/EQ-29 (C1)  TP204/EQ-29 (C1)  Spec: $A \leqq \frac{1}{4} B$ Check the Audio level is less than 1/4 of Video level.	(Confirm)
• Reconnect CN451 to CN454 on REC-11P board.		
• Cansel the edit mode.		

SECTION 14
VIDEO SIGNAL SYSTEM ALIGNMENT

14-1. ALIGNMENT SEQUENCE


START
14-2. Alignment Preparation
14-3. Video Output Offset Level Alignment (VM-05 board)
14-4. Video Output Level Alignment (VM-05 board)
14-5. Video Output Frequency Response Alignment (VM-05 board)
14-6. Burst Level Alignment (PR-163 board)
14-7. V Reset Pulse Width Alignment (PR-163 board)
14-8. Pal H Modulation Width Alignment (PR-163 board)
14-9. CF Control Alignment (1) (PR-163 board)
14-10. CF Error Detection Alignment (PR-163 board)
14-11. CF Control Alignment (2) (PR-163 board)
14-12. SC Phase Alignment (PR-163 board)
NOTE 2
14-13. Video A/D Converter Reference Voltage Alignment (AD-73 board)
14-14. Burst Tuning Alignment (AD-73 board)
NOTE 2
14-15. Video Input Offset Level Alignment (AD-73 board)
14-16. Video Input Level Alignment (AD-73 board)
NOTE 2
14-17. Video A/D Converter Matching Alignment (AD-73 board)
14-18. Video Sampling Phase Alignment (AD-73 board)
14-19. CF Error Detection Circuit Alignment (AD-73 board)
14-20. Input Video Signal SC-H Phase Alignment (AD-73 board)
14-21. Input Video Signal Color Framing Alignment (AD-73 board)
NOTE 1
14-22. Internal Frequency Alignment (AD-73 board)
14-23. Multi-loop test using Alignment (AD-73 board)
END

NOTE 1: The alignment is not necessary on the following sets.
DVR-20P: S/N 10701 and higher
DVR-28P: S/N 10601 and higher

NOTE 2: The alignment is not necessary on the following sets.
(AD-73 BOARD: A-8275-659-A)
DVR-20P: S/N 11701 and higher
DVR-28P: S/N 11201 and higher

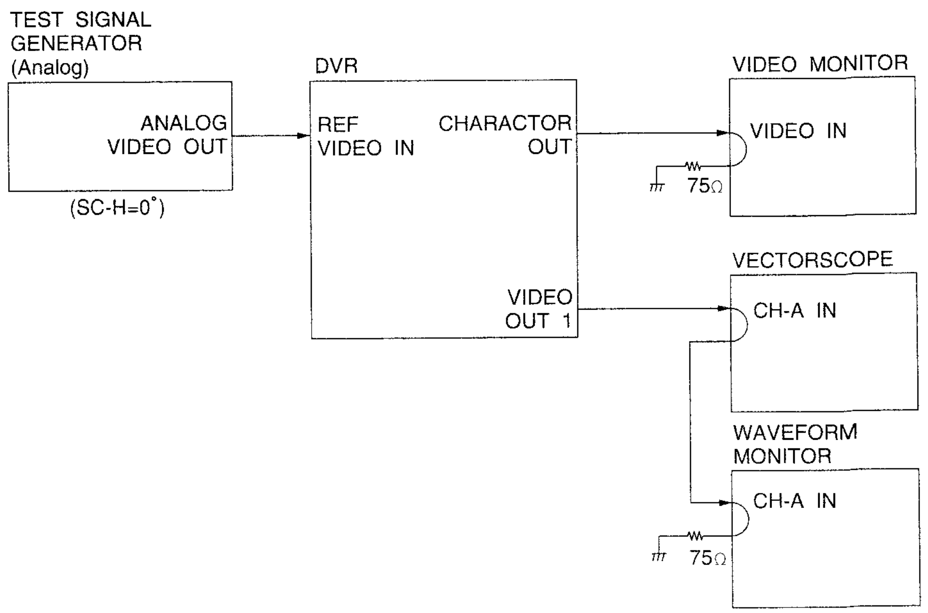
14-2. ALIGNMENT PREPARATION

[Eqipment Required]

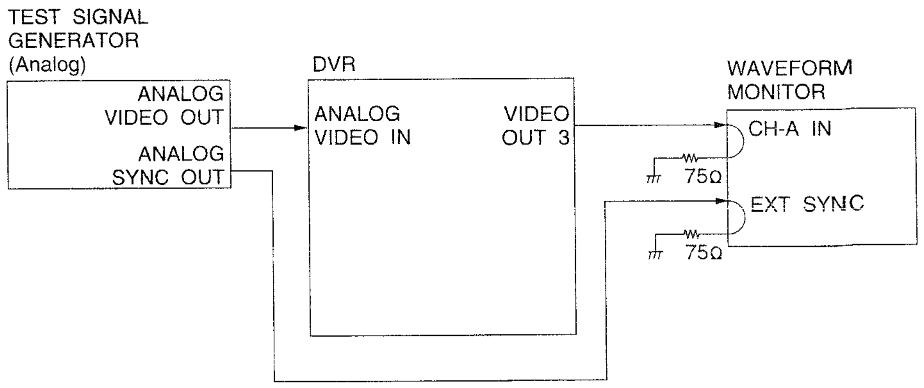
- Oscilloscope (Equivalent Product: 2445 or 2465/Tektronix)
- Vectorscope (Equivalent Product: 1751/Tektronix)
- Waveform Monitor (Equivalent Product: 1485R/Tektronix)
- Video Picture Monitor (Equivalent Product: BVM2010P/Sony)
- Test Signal Generator (Equivalent Product: 1411 or TSG-273/Tektronix)
- Alignment tape (ER5-2 PAL)

[Connection]

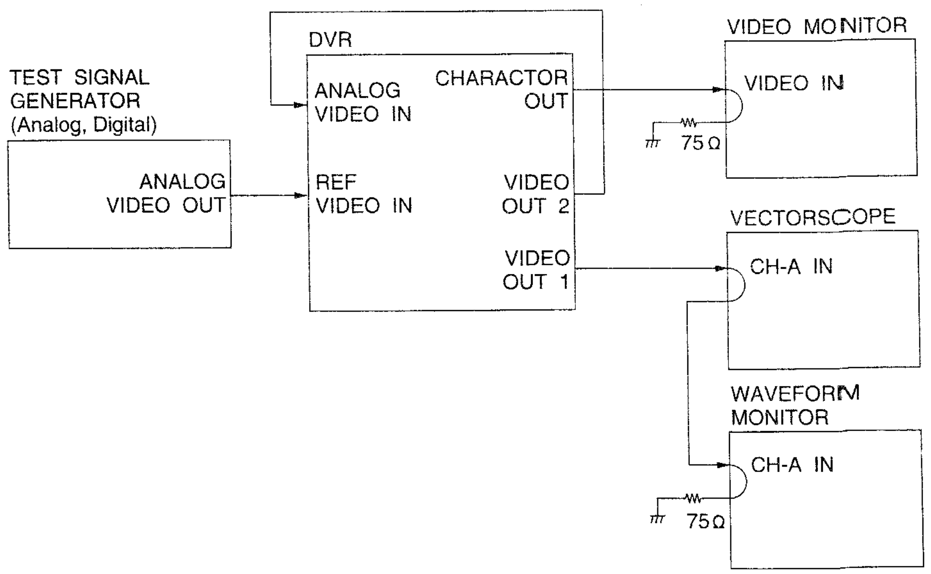
Connection 1.

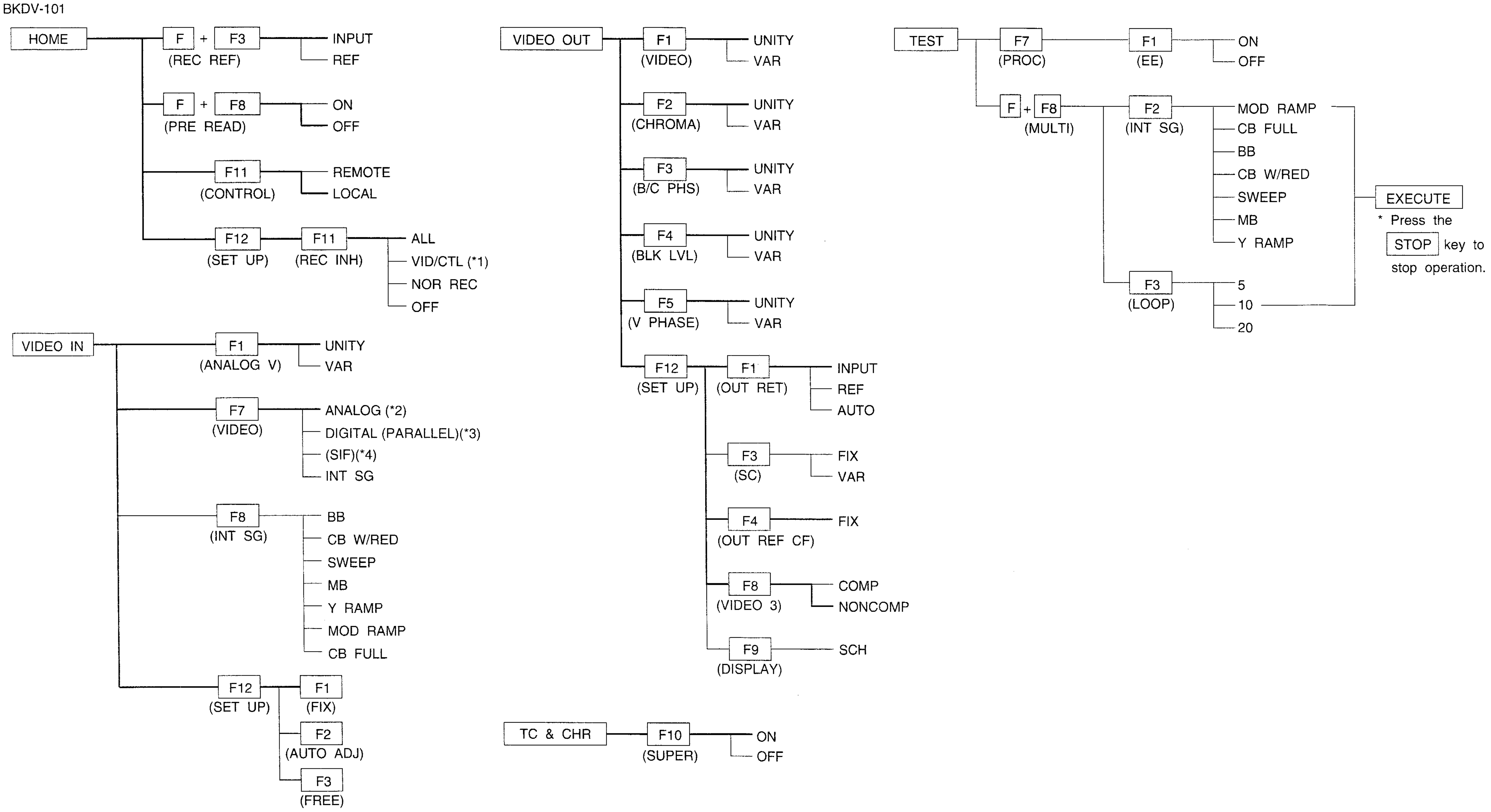

TEST SIGNAL GENERATOR (Analog)
ANALOG VIDEO OUT
(SC-H=0°)
DVR
REF VIDEO IN
CHARACTOR OUT
VIDEO OUT 1
VIDEO MONITOR
VIDEO IN
75Ω
VECTORSCOPE
CH-A IN
WAVEFORM MONITOR
CH-A IN
75Ω

Connection 2.


TEST SIGNAL GENERATOR (Analog)
ANALOG VIDEO OUT
ANALOG SYNC OUT
DVR
ANALOG VIDEO IN
VIDEO OUT 3
WAVEFORM MONITOR
CH-A IN
75Ω
EXT SYNC
75Ω

Connection 3.


TEST SIGNAL GENERATOR (Analog, Digital)
ANALOG VIDEO OUT
DVR
ANALOG VIDEO IN
CHARACTOR OUT
REF VIDEO IN
VIDEO OUT 2
VIDEO OUT 1
VIDEO MONITOR
VIDEO IN
75Ω
VECTORSCOPE
CH-A IN
WAVEFORM MONITOR
CH-A IN
75Ω


BKDV-101
HOME
F + F3
(REC REF)
INPUT
REF
F + F8
(PRE READ)
ON
OFF
F11
(CONTROL)
REMOTE
LOCAL
F12
(SET UP)
F11
(REC INH)
ALL
VID/CTL (*1)
NOR REC
OFF
VIDEO IN
F1
(ANALOG V)
UNITY
VAR
F7
(VIDEO)
ANALOG (*2)
DIGITAL (PARALLEL)(*3)
(SIF)(*4)
INT SG
F8
(INT SG)
BB
CB W/RED
SWEEP
MB
Y RAMP
MOD RAMP
CB FULL
F12
(SET UP)
F1
(FIX)
F2
(AUTO ADJ)
F3
(FREE)
VIDEO OUT
F1
(VIDEO)
UNITY
VAR
F2
(CHROMA)
UNITY
VAR
F3
(B/C PHS)
UNITY
VAR
F4
(BLK LVL)
UNITY
VAR
F5
(V PHASE)
UNITY
VAR
F12
(SET UP)
F1
(OUT RET)
INPUT
REF
AUTO
F3
(SC)
FIX
VAR
F4
(OUT REF CF)
FIX
F8
(VIDEO 3)
COMP
NONCOMP
F9
(DISPLAY)
SCH
TC & CHR
F10
(SUPER)
ON
OFF
TEST
F7
(PROC)
F1
(EE)
ON
OFF
F + F8
(MULTI)
F2
(INT SG)
MOD RAMP
CB FULL
BB
CB W/RED
SWEEP
MB
Y RAMP
F3
(LOOP)
5
10
20
EXECUTE
* Press the STOP key to stop operation.

*1 This can be set by the USER HOLE of the cassette.
*2. In the DVR-C20, ANALOG mode cannot be selected.
*3. The figures in parentheses are displayed when BKDV-105/106/205/206 are mounted.
*4. The content in parentheses can be selected only when BKDV-105/106/205/206 are mounted.

BKDV-105 : Corresponding to DVR-28
BKDV-106 : Corresponding to DVR-28P
BKDV-205 : Corresponding to DVR-20/C20
BKDV-206 : Corresponding to DVR-20P/C20P

- VIDEO OUT , F12 (SET UP) and F9 → SCH at BKDV-101 indicate the input SCH meter on the control panel.

[Control Panel Setting]

(REC REF) = INPUT
(PRE READ) = OFF
VIDEO IN: (ANALOG V) = UNITY
(VIDEO) = ANALOG
VIDEO OUT: (VIDEO) = UNITY
(CHROMA) = UNITY
(B/C PHS) = UNITY
(BLK LVL) = UNITY
(V PHASE) = UNITY
TC & CHR: (SUPER) = ON
SET UP/VIDEO IN: (IN CF) = FIX
SET UP/VIDEO OUT: (OUT REF) = INPUT
(OUT REF CF) = FIX
(VIDEO 3) = NON COMP

[Switch/Jumper Initial Setting]

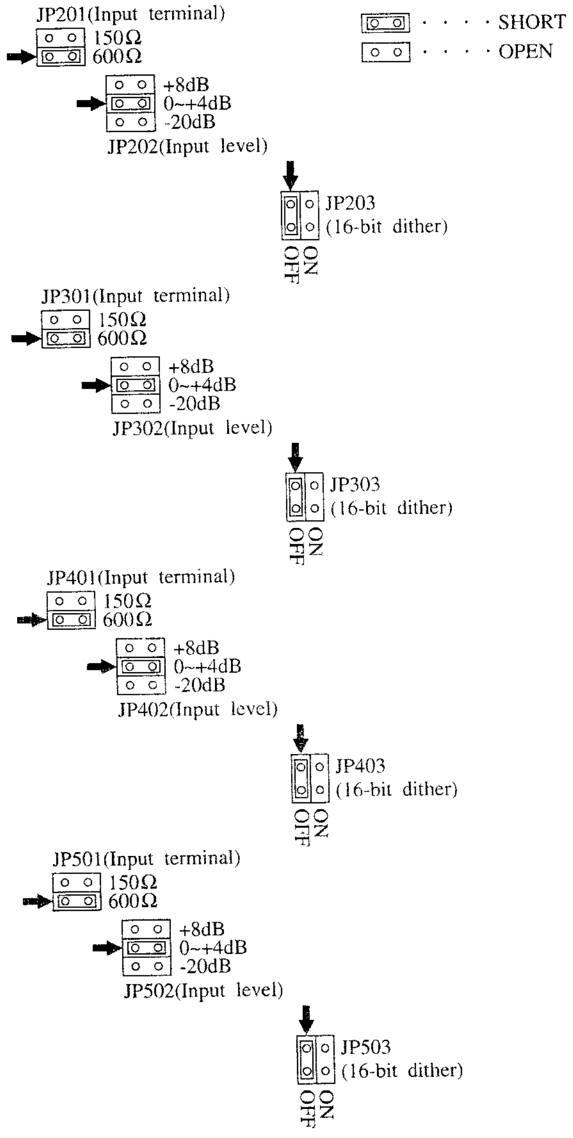
AD-73 board
DVR-20P: S/N 10001 to 10699
DVR-28P: S/N 10001 to 10599
JP1/2.....................................JP1
JP201, 301, 401, 501............SHORT
JP202, 302, 402, 502............OPEN
JP203, 303, 403, 503............OPEN
JP204, 304, 404, 504............OPEN
JP205, 305, 405, 505............SHORT
JP206, 306, 406, 506............OPEN
JP207, 307, 407, 507............OPEN

EN-99 board
JW 1, 3, 5, ...SHORT
JW2 , 4, 7, X5........................OPEN
S2-1, 2, 3, 4, 5, 6, 7, 8. ....ON
S3-1, 2, 3, 4, 5, 6, 7, 8...........OFF
S3-5, 6, 8, 10..........................ON
S4-1, 2, 3, 4, 5, 6, 7, 8...........ON

PR-163 board
S1...ON
S2-1, 7, 8.................................ON
S2-2, 3, 4, 5, 6, 9, 10..............OFF
S3-1, 2, 3, 4, 5, 6, 7, 8, 9, 10...ON
S4-1, 2, 3, 4, 5, 6, 7, 8............OFF

AD-73 board (A-6019-054-A)
DVR-20P: S/N 10701 to 11699
DVR-28P: S/N 10601 to 11999
JP201, 301, 401, 501
Input terminal..................................600 Ω
JP202, 302, 402, 502
Input level.......................................0~+4 dB
JP203, 303, 403, 503
16-bit dither ....OFF

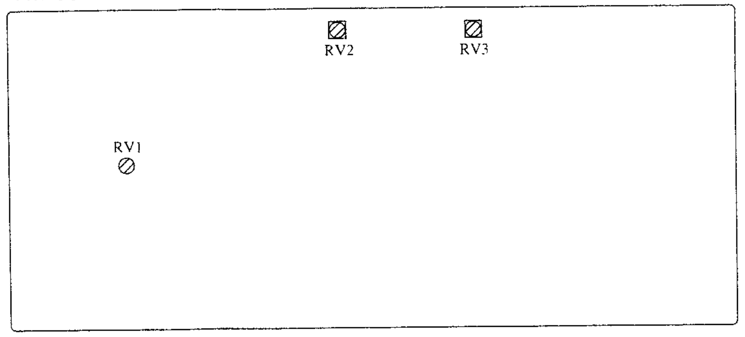
The jumper initial setting is set to the following arrow position.


SHORT
OPEN
JP201(Input terminal)
150Ω
600Ω
+8dB
0~+4dB
-20dB
JP202(Input level)
JP203
(16-bit dither)
ON
OFF
JP301(Input terminal)
150Ω
600Ω
+8dB
0~+4dB
-20dB
JP302(Input level)
JP303
(16-bit dither)
ON
OFF
JP401(Input terminal)
150Ω
600Ω
+8dB
0~+4dB
-20dB
JP402(Input level)
JP403
(16-bit dither)
ON
OFF
JP501(Input terminal)
150Ω
600Ω
+8dB
0~+4dB
-20dB
JP502(Input level)
JP503
(16-bit dither)
ON
OFF

AD-73 board (A-8275-659-A)
DVR-20P: S/N 11701 and higher
DVR-28P: S/N 12001 and higher
JP201, 301, 401, 501
Input terminal..................................600 Ω
JP202, 302, 402, 502
Input level.......................................0~+8 dB

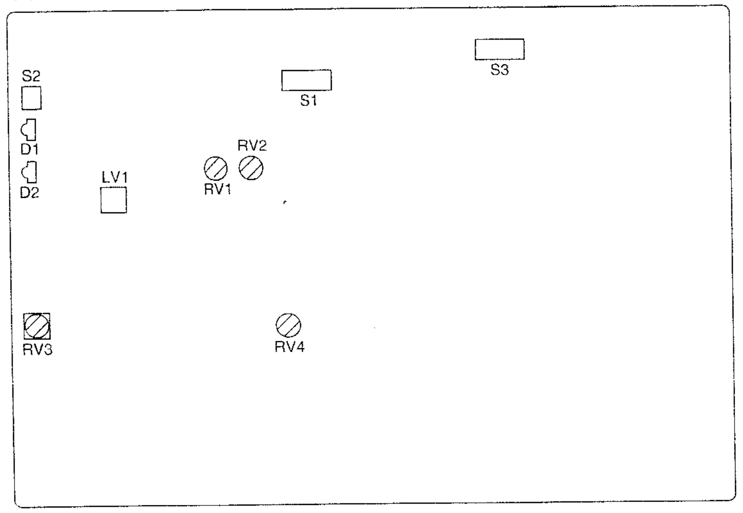
[Location]

VM-05 Board



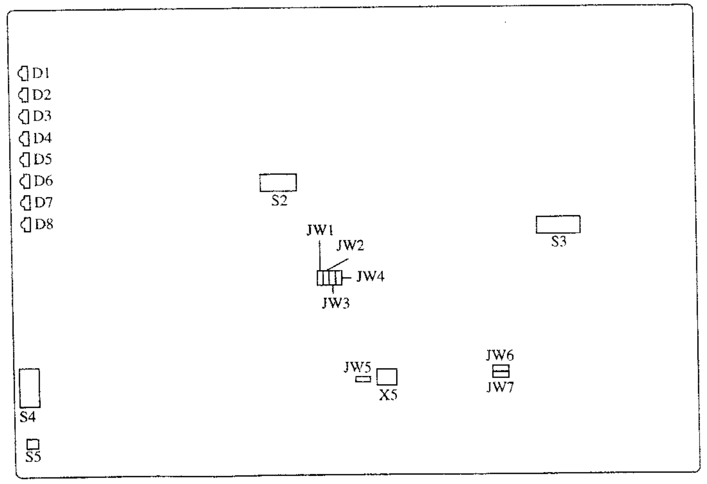
COMPONENT SIDE

PR-163 Board


S3
S2
S1
D1
D2
RV2
LV1
RV1
RV3
RV4

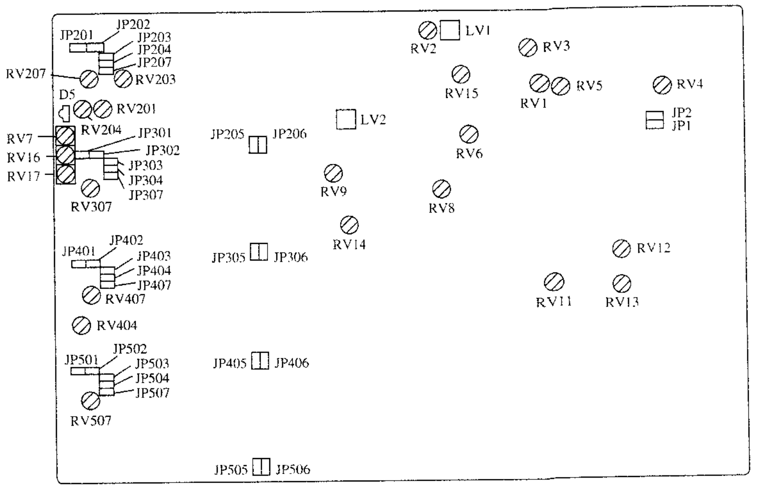
A SIDE

EN-99 Board


D1
D2
D3
D4
D5
D6
D7
D8
S2
S3
JW1
JW2
JW4
JW3
JW6
JW5
X5
JW7
S4
S5

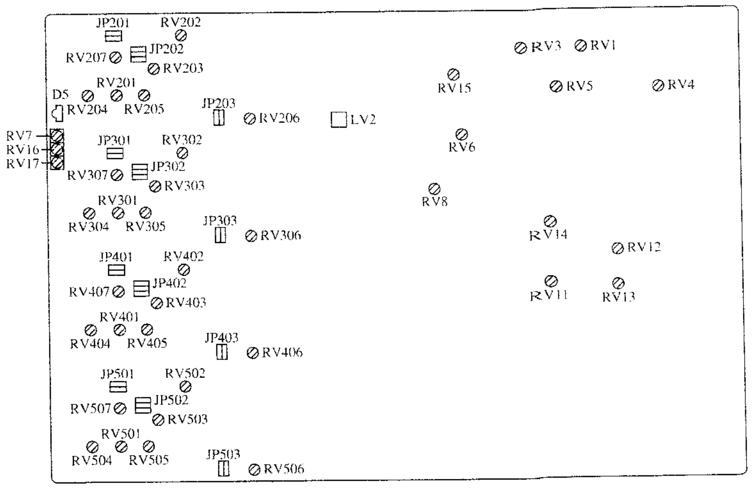
A SIDE

AD-73 Board DVR-20P : S/N 10001 to 10699
DVR-28P : S/N 10001 to 10599


JP201
JP202
JP203
JP204
JP207
RV207
RV203
D5
RV201
RV204
RV7
RV16
RV17
JP301
JP302
JP303
JP304
JP307
RV307
JP401
JP402
JP403
JP404
JP407
RV407
RV404
JP501
JP502
JP503
JP504
JP507
RV507
JP205
JP206
JP305
JP306
JP405
JP406
JP505
JP506
RV2
LV1
LV2
RV3
RV15
RV1
RV5
RV4
JP2
JP1
RV6
RV9
RV8
RV14
RV12
RV11
RV13

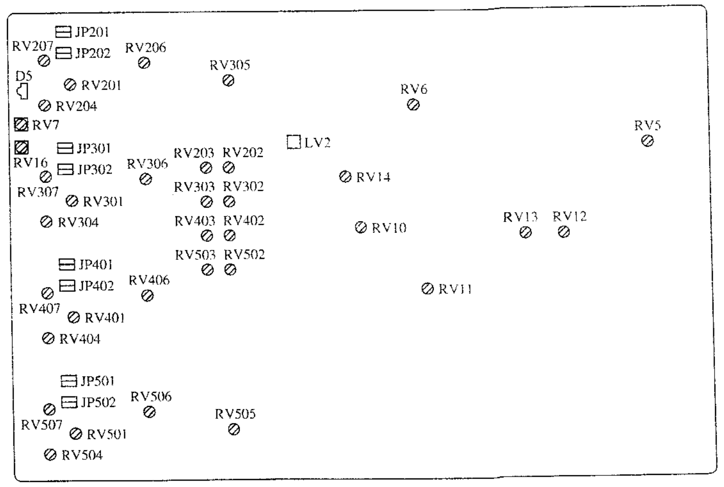
A SIDE

AD-73 Board DVR-20P : S/N 10701 to 11699
DVR-28P : S/N 10601 to 11999 (A-6019-054-A)

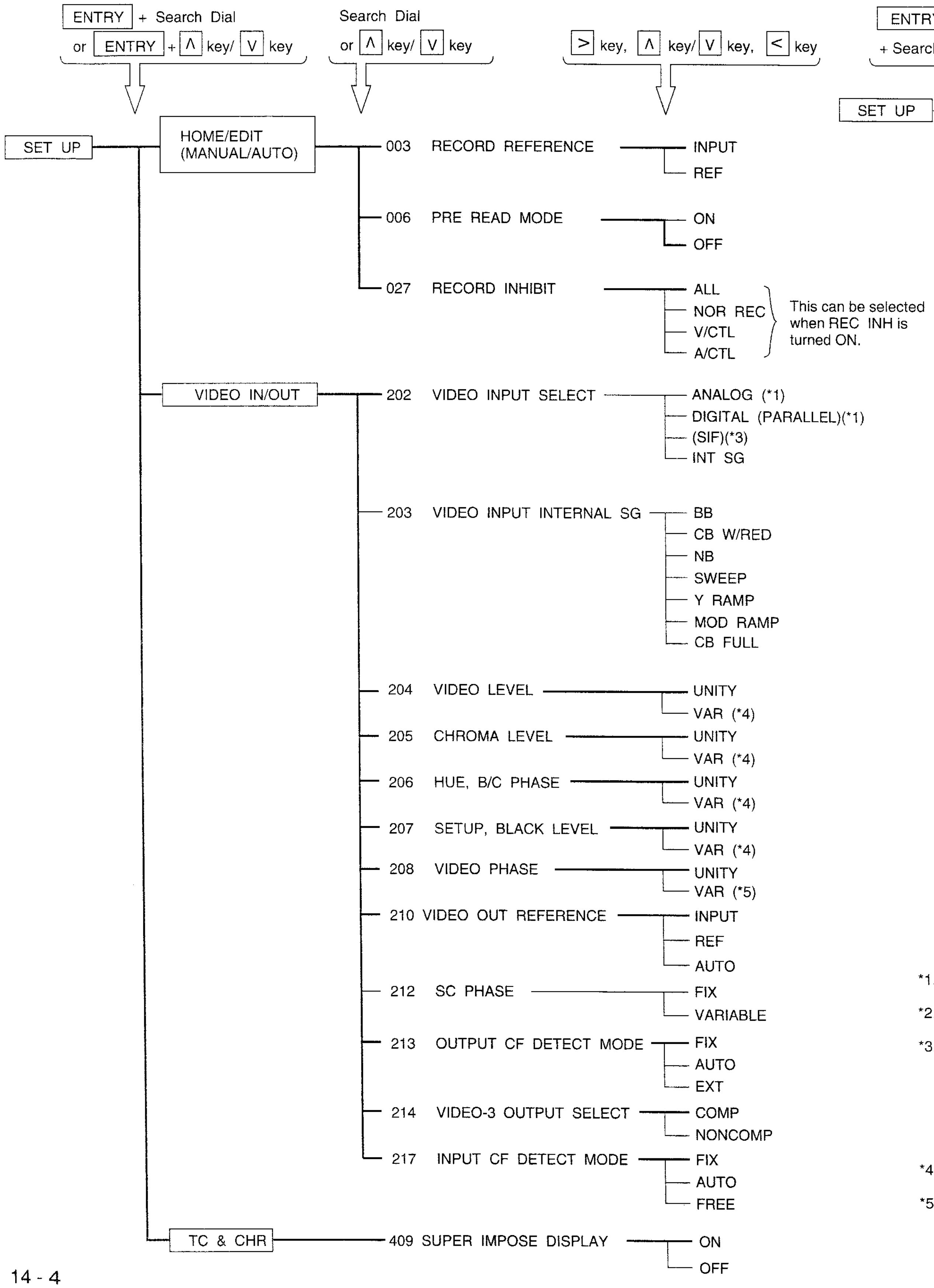

JP201
RV202
RV207
JP202
RV203
RV201
D5
RV204
RV205
JP203
RV206
LV2
RV7
RV16
RV17
JP301
RV302
RV307
JP302
RV303
RV301
RV304
RV305
JP303
RV306
JP401
RV402
RV407
JP402
RV403
RV401
RV404
RV405
JP403
RV406
JP501
RV502
RV507
JP502
RV503
RV501
RV504
RV505
JP503
RV506
RV3
RV1
RV15
RV5
RV4
RV6
RV8
RV14
RV12
RV11
RV13

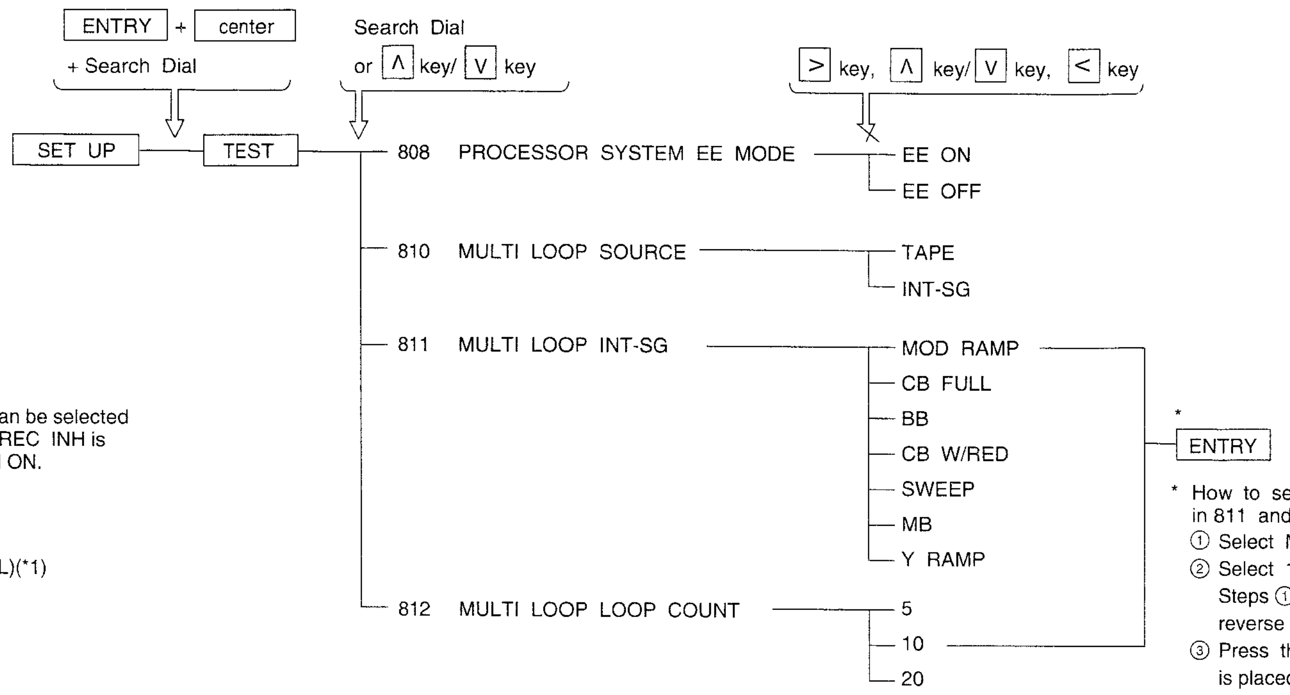
A SIDE

AD-73 Board DVR-20P : S/N 11701 and higher
DVR-28P : S/N 12001 and higher (A-8275-659-A)


JP201
RV207
JP202
RV206
RV305
D5
RV201
RV204
RV7
JP301
RV16
JP302
RV306
RV203
RV202
RV303
RV302
RV307
RV301
RV304
RV403
RV402
RV503
RV502
JP401
JP402
RV406
RV407
RV401
RV404
JP501
JP502
RV506
RV505
RV507
RV501
RV504
LV2
RV6
RV14
RV10
RV11
RV5
RV13
RV12

A SIDE


ENTRY + Search Dial
or ENTRY + ∧ key/ ∨ key
Search Dial
or ∧ key/ ∨ key
> key, ∧ key/ ∨ key, < key
SET UP
HOME/EDIT (MANUAL/AUTO)
003 RECORD REFERENCE
INPUT
REF
006 PRE READ MODE
ON
OFF
027 RECORD INHIBIT
ALL
NOR REC
V/CTL
A/CTL
This can be selected when REC INH is turned ON.
VIDEO IN/OUT
202 VIDEO INPUT SELECT
ANALOG (*1)
DIGITAL (PARALLEL)(*1)
(SIF)(*3)
INT SG
203 VIDEO INPUT INTERNAL SG
BB
CB W/RED
NB
SWEEP
Y RAMP
MOD RAMP
CB FULL
204 VIDEO LEVEL
UNITY
VAR (*4)
205 CHROMA LEVEL
UNITY
VAR (*4)
206 HUE, B/C PHASE
UNITY
VAR (*4)
207 SETUP, BLACK LEVEL
UNITY
VAR (*4)
208 VIDEO PHASE
UNITY
VAR (*5)
210 VIDEO OUT REFERENCE
INPUT
REF
AUTO
212 SC PHASE
FIX
VARIABLE
213 OUTPUT CF DETECT MODE
FIX
AUTO
EXT
214 VIDEO-3 OUTPUT SELECT
COMP
NONCOMP
217 INPUT CF DETECT MODE
FIX
AUTO
FREE
TC & CHR
409 SUPER IMPOSE DISPLAY
ON
OFF


ENTRY + center
+ Search Dial
Search Dial
or ∧ key/ ∨ key
> key, ∧ key/ ∨ key, < key
SET UP
TEST
808 PROCESSOR SYSTEM EE MODE
EE ON
EE OFF
810 MULTI LOOP SOURCE
TAPE
INT-SG
811 MULTI LOOP INT-SG
MOD RAMP
CB FULL
BB
CB W/RED
SWEEP
MB
Y RAMP
812 MULTI LOOP LOOP COUNT
5
10
20
*
ENTRY

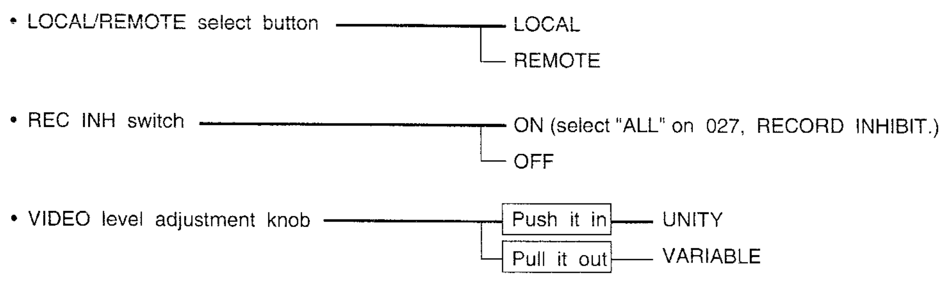
* How to set the items that are selected in 811 and 812

① Select MOD RAMP in 811.

② Select 10 in 812.
Steps ①and② can be carried out in reverse order.

③ Press the ENTRY key while the cursor is placed at 10 (or MOD RAMP).

Note: Press the STOP Key to stop operation.


• LOCAL/REMOTE select button
LOCAL
REMOTE
• REC INH switch
ON (select "ALL" on 027, RECORD INHIBIT.)
OFF
• VIDEO level adjustment knob
Push it in
UNITY
Pull it out
VARIABLE

*1. In the DVR-C20, ANALOG mode cannot be selected.

*2. The figures in parentheses are displayed when BKDV-105/106/205/206 are mounted.

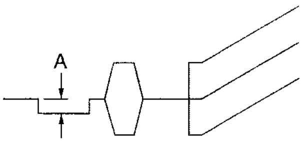
*3. The content in parentheses can be selected only when BKDV-105/106/205/206 are mounted.

BKDV-105 : Corresponding to DVR-28
BKDV-106 : Corresponding to DVR-28
BKDV-205 : Corresponding to DVR-20/C20
BKDV-206 : Corresponding to DVR-20P/C20P

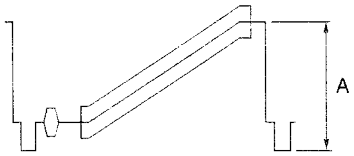
*4.

*5. VARs are -2, -1, +1 and +2.

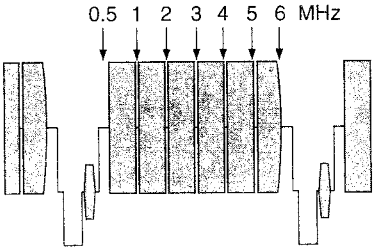
14-3. VIDEO OUTPUT OFFSET LEVEL ALIGNMENT (VM-05 board)

Conditions for alignment	Specifications	Adjustments
• Connection: 14-2. Connection 2 • VTR: STOP (EE) • Input signal (ANALOG VIDEO IN): Free • Switch/Jumper setting: Same as Sec. 14-2. • Control panel setting VIDEO IN (VIDEO) → INT SG (INT SG) → MOD RAMP Other settings are the same as Sec. 14-2. • Waveform Monitor	VIDEO OUTPUT 3  A=0.00±0.01 V	⊘ RV2/VM-05/D1

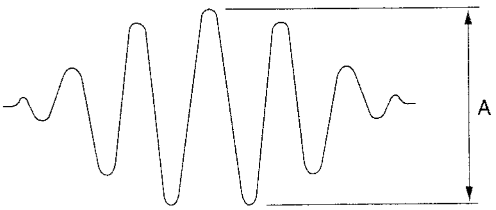
14-4. VIDEO OUTPUT LEVEL ALIGNMENT (VM-05 board)

Conditions for alignment	Specifications	Adjustments
• Connection: 14-2. Connection 2 • VTR: PLAY • Input signal (ANALOG VIDEO IN): Free • Switch/Jumper setting: Same as Sec. 14-2. • Control panel setting VIDEO IN (VIDEO) → INT SG (INT SG) → MOD RAMP Other settings are the same as Sec.14-2. • Waveform monitor	VIDEO OUTPUT 3  A=0.00±0.01 V	⊘ RV3/VM-05/F1

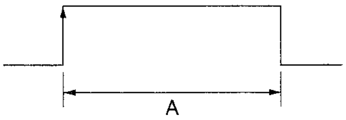
14-5. VIDEO OUTPUT FREQUENCY RESPONCE ALIGNMENT (VM-05 board)

Conditions for alignment	Specifications	Adjustments
• Connection: 14-2. Connection 1 • VTR: STOP (EE) • Input signal (ANALOG VIDEO IN): H sweep • Switch/Jumper setting: Same as Sec. 14-2. • Control panel setting: VIDEO IN (VIDEO) → INT SG (INT SG) → SWEEP Other settings are the same as Sec. 14-2. • Waveform monitor	VIDEO OUTPUT 3  0.5 to 6.0 MHz=Flat (Within ±2% based on 0.5 MHz.)	⊘ RV1/VM-05 (B3)

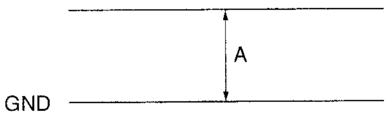
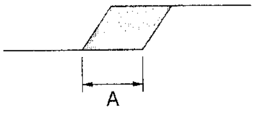
14-6. BURST LEVEL ALIGNMENT (PR-163 board)

Conditions for alignment	Specifications	Adjustments
• Connection: 14-2. Connection 1 • VTR: STOP (EE) • Input signal (ANALOG VIDEO IN): Free (REF VIDEO IN): BLACK BURST (SCH=0), 75-ohm terminated. • Switch/Jumper setting: Same as Sec. 14-2. • Control panel setting: HOME: (REC REF) →REF VIDEO IN: (VIDEO) →INT SG (Color bar) SET UP/VIDEO OUT: (REF) →REF • More than five minutes are passed after switch the power ON, then the following alignments. • Oscilloscope 100mV/DIV 1μS/DIV TRIG (−): TP16/PR-163 (F8) MODE: 20MHz BW LIMIT	TP2/PR-163 (C8)  A=500±60Vp-p • Adjust ⊘ LV1/PR-157 (B3) so that the burst amplitude becomes maximum.	⊘ LV1/PR-163 (B3)

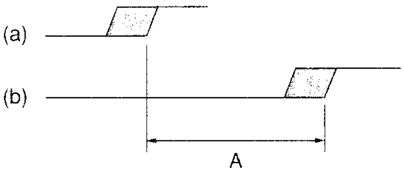
14-7. V RESET PULSE WIDTH ALIGNMENT (PR-163 board)

Conditions for alignment	Specifications	Adjustments
• Connection: 14-2. Connection 1 •VTR: STOP (EE) • Input signal (ANALOG VIDEO IN): Free (REF VIDEO IN): BLACK BURST (SCH=0), 75-ohm terminated. • Switch/Jumper setting: Same as Section 7-4. • Control panel setting: HOME: (REC REF) → REF VIDEO IN: (VIDEO) → INT SG (Color bar) Other settings are the same as Section 14-2. • Oscilloscope 1V/DIV 20μS/DIV TRIG (+) : TP17/PR-163 (B7)	TP17/PR-163 (B7)  A=108±4μS	⊘RV7/PR-163 (A21)

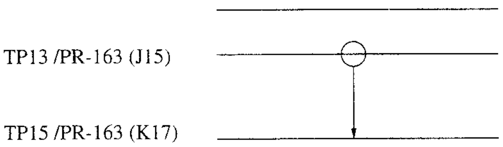
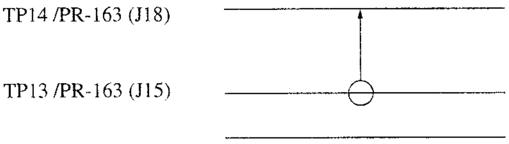
14-8. PAL H MODULATION WIDTH ALIGNMENT (PR-163 board)

Conditions for alignment	Specifications	Adjustments
STEP 1. • Connection: 14-2. Connection 1 •VTR: STOP (EE) • Input signal (ANALOG VIDEO IN) : Free (REF VIDEO IN) : BLACK BURST (SCH=0), 75-ohm terminated. • Switch/Jumper setting: Same as Sec. 14-2. • Control panel setting: HOME: (REC REF) → REF VIDEO IN: (VIDEO) → INT SG (Color bar) SET UP/VIDEO OUT: (OUT REF) →REF (OUT REF CF) →FIX Other settings are the same as Sec. 14-2. • Oscilloscope 100mV/DV 20μS/DIV	TP18 /PR-163 (G11)  A=0.5±0.05V Preadjust ⊘RV3/PR-163 (A15) as following level of TP18/PR-163 (G11)	⊘RV3/PR-163 (A15)
STEP 2. • Oscilloscope 1V/DIV 100μS/DIV TRIG (−): TP16/PR-163 (F8)	TP19/PR-163 (J10)  A=110±5nS	⊘RV1/PR-163 (G8)

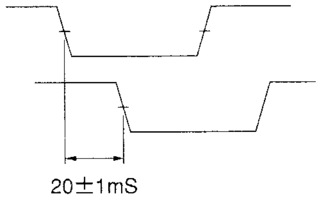
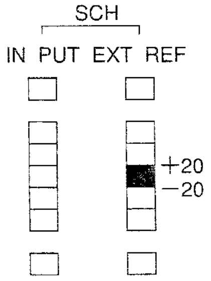
14-9. CF CONTROL ALIGNMENT (1) (PR-163 board)

Conditions for alignment	Specifications	Adjustments
STEP 1. • Connection: 14-2. Connection 1 • VTR: STOP (EE) • Input signal (ANALOG VIDEO IN) : Free (REF VIDEO IN) : BLACK BURST (SCH=0), 75-ohm terminated. • Switch/Jumper setting: S4-2/EN-99 (A22) : OFF Other setting are the same as Sec. 14-2. • Control panel setting: HOME: (REC REF) → REF VIDEO IN: (VIDEO) → INT SG (Color bar) SET UP/VIDEO OUT: (OUT REF) →REF Other settings are the same as Sec. 14-2. • Oscilloscope 1V/DIV 100nS/DIV TRIG (–): TP16/PR-163 (F8)	TP19 /PR-163 (J10)  A=450±10nS (a) or (b) wave appears alternately on the screen. Shift the (b) wave by 450±10 nS from the (a).	⊘ RV2/PR-163 (H8)
STEP 2. Switch the test switch S4-2/EN-99 (A22) ON.		

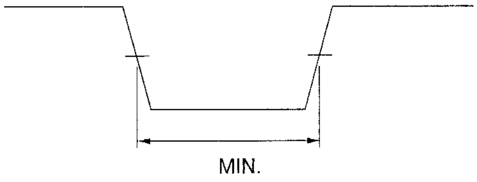
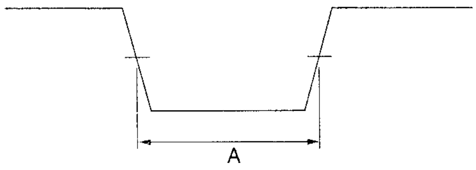
14-10. CF ERROR DETECTION ALIGNMENT (PR-163 board)

Conditions for alignment	**Specifications**	**Adjustments**
• Connection: 14-2. Connection 1 •VTR: STOP (EE) • Input signal (ANALOG VIDEO IN) : Free (REF VIDEO IN) : BLACK BURST (SCH=0), 75-ohm terminated. • Switch/Jumper setting: S4-2/EN-99 (A22) : OFF Other settings are the same as Sec. 14-2. • Control panel setting: HOME: (REC REF) → REF VIDEO IN: (VIDEO) → INT SG (Color bar) SET UP/VIDEO OUT: (OUT REF) →REF TC & CHR: (SUPER) → ON Other settings are the same as Sec. 14-2. • Oscilloscope 1V/DIV 10mS/DIV MODE: 200 MHz BW LIMIT	STEP 1.  Fit the low level of TP13/PR-163 (J15) to the level of TP15/PR-163 (K17).	⊘RV6/PR-163 (J17) (Offset alignment)
	STEP 2.  Fit the high level of TP13/PR-163 (J15) to the level of TP14/PR-163 (J18).	⊘RV4/PR-163 (J15) (Gain alignment)
	STEP 3. Confirm that the high and low levels of TP13/PR-163 (J15) are same as the levels of TP14/PR-163 (J18) and TP15/PR-163 (K17). If they don't meet the specification, readjust from STEP 1.	

14-11. CF CONTROL ALIGNMENT (2) (PR-163 board)

Conditions for alignment	Specifications	Adjustments
STEP 1. • Connection: 14-2. Connection 1 •VTR: STOP (EE) • Input signal (ANALOG VIDEO IN) : Free (REF VIDEO IN) : BLACK BURST (SCH=0), • Switch/Jumper setting: S4-2/EN-99 (A22): ON Other settings are the same as Sec. 14-2. • Control panel setting: VIDEO IN: (VIDEO) → INT SG (Color bar) TC & CHR: (SUPER) → ON SET UP/VIDEO OUT: (REF) →REF Other settings are the same as Sec. 14-2. • ⊘RV3/PR-163 (A15) : Mechanical center. • Video picture monitor	While observing the video picture monitor, perform adjustment so that the displayed data (CF ERROR) falls between 20 and 22 (hexadecimal) of the figure below. Video picture monitor T*R. XX:XX:XX:XX VRF. 0000 FF FF FF FF ERR. XXXX FF FF FF FF SCH. OUT 20-80 IN 20-80 20~22 (Hex.)	⊘RV3/PR-163 (A5) (CF error Adjustment)
STEP 2. • VTR: SYSTEM EE • Press the keys on the control panel in the following order. TEST , (PROC), (EE ON) • Oscilloscope 5V/DIV 20mS/DIV	TP9/PR-163 (A19) TP9/PR-163 (A18) 	(Check)
STEP 3. • Remove EX-138 extension board and reinstall PR-163 board to its original position, then confirm that the CF ERROR data displayed on the picture monitor is between 1E and 22 (hexadecimal). If it doesn't meet the specification, readjust STEP1.		
STEP 4. • Press the key on the control panel in the following order. SET UP/VIDEO OUT; (SCH) Confirm that the control panel display the SCH level of the EXT REF signal within ±20 degrees.		
STEP 5. • Switch S4-2/EN-99 (A22) ON.		

14-12. SC PHASE ALIGNMENT (PR-163 board)

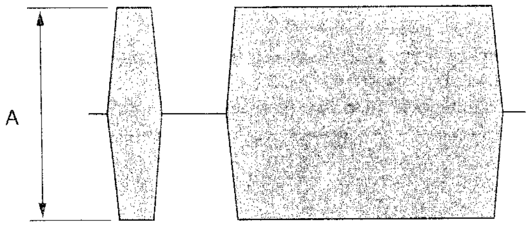
Conditions for alignment	Specifications	Adjustments
STEP 1. • Connection: 14-2. Connection 1 •VTR: STOP (EE) • Input signal (REF VIDEO IN): BLACK BURST (SCH=0), 75-ohm terminated. • Switch/Jumper setting: Same as Sec. 14-2. • Control panel setting: VIDEO IN: (VIDEO) → INT SG (Free) VIDEO OUT: (SET UP) (REF) → REF VIDEO OUT: (SET UP) (SC) Other settings are the same as Sec. 14-2. • Oscilloscope 1V/DIV 50µS/DIV	TP17/PR-163 (B19)  • Adjust the level control so that the low level interval of TP17/PR-157 (B19) becomes minimum.	⊘ Level Control/ Function Control Panel
STEP 2. • Oscilloscope 1V/DIV 50µS/DIV	TP17/PR-163 (B19) 	⊘ RV4/PR-163 (D21)
STEP 3. • Press the (SC) key. • Vectorscope	• Confirm that the SC phase is changed more than 360$^{+2}_{-0}$ degrees on the vectorscope. • If they don't meet the specification, readjust from STEP 2.	⊘ Level Control/ Function Control Panel

14-13. VIDEO A/D CONVERTOR REFERENCE VOLTAGE ALIGNMENT (AD-73 board)

NOTE: This alignment is not necessary on the following board. **MOUNTED CIRCUIT BOARD, AD-73**
Sony part No. A-8275-659-A

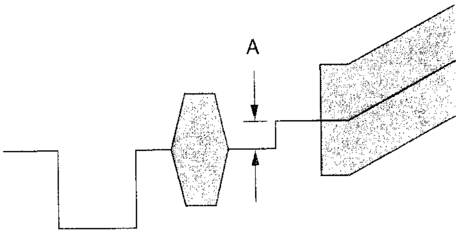
Conditions for alignment	Specifications	Adjustments
STEP 1. • Connection: 14-2. Connection 1 • VTR: STOP (EE) • Input signal (ANALOG VIDEO IN): Free • Switch/Jumper setting: Same as Sec. 14-2. • Control panel setting: Same as Sec. 14-2. • Digital Voltmeter	TP4/AD-73 (B16) −2.00±0.01 Vdc	⊘ RV3/AD-73 (B16)
STEP 2. • After making alignments, perform the following alignments. 14-8. Video Input Offset Level Alignment (AD-73 board) 14-9. Video Input Level Alignment (AD-73 board)		

14-14. BURST TUNING ALIGNMENT (AD-73 board)

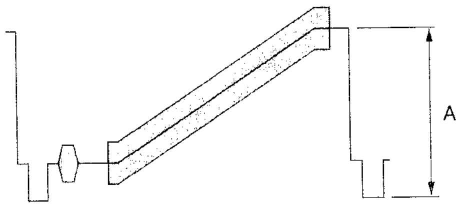
Conditions for alignment	Specifications	Adjustments
STEP 1. • Connection: 14-2. Connection 1 • VTR: STOP (EE) • Input signal (ANALOG VIDEO IN): Video signal with burst (SCH=0) • Switch/Jumper setting: Same as Sec. 14-2. • Control panel setting: Same as Sec. 14-2. • Oscilloscope 200mV/DIV 10µS/DIV	**MOUNTED CIRCUIT BOARD, AD-73** **Sony part No. A-6019-054-A** TP1/AD-73 (C8) **MOUNTED CIRCUIT BOARD, AD-73** **Sony part No. A-8275-659-A** TP1/AD-73 (C9)  **MOUNTED CIRCUIT BOARD, AD-73** **Sony part No. A-6019-054-A** A=Maximum (≧800 mVp-p) **MOUNTED CIRCUIT BOARD, AD-73** **Sony part No. A-8275-659-A** A=Maximum (≧1 Vp-p)	**MOUNTED CIRCUIT BOARD, AD-73** **Sony part No. A-6019-054-A** ⊘ LV2/AD-73 (C9) **MOUNTED CIRCUIT BOARD, AD-73** **Sony part No. A-8275-659-A** ⊘ LV2/AD-73 (C8)
STEP 2. • After making alignmint, perform the following alignments. 14-11. Video Sampling Phase Alignmint 14-13. Input Video Signal SC-H Phase Alignmint • 14-14. Input Video Signal Color Framing Alignmint		

14-15. VIDEO INPUT OFFSET LEVEL ALIGNMENT (AD-73 board)

NOTE: This alignment is not necessary on the following board. **MOUNTED CIRCUIT BOARD, AD-73**
Sony part No. A-8275-659-A

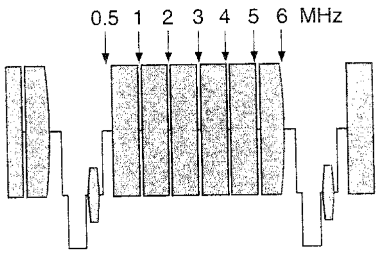
Conditions for alignment	Specifications	Adjustments
• Connection: 14-2. Connection 1 • VTR: STOP (EE) • Input signal (ANALOG VIDEO IN): LINEARITY (SCH=0) • Switch/Jumper setting: Same as Sec. 14-2. • Control panel setting: Same as Sec. 14-2. • ⊘ RV17/AD-73 (D1): Mechanical center • Waveform monitor	VIDEO OUTPUT 1  A=0±5mV	⊘ RV4/AD-73 (C21)

14-16 VIDEO INPUT LEVEL ALIGNMENT (AD-73 board)

Conditions for alignment	Specifications	Adjustments
• Connection: 14-2. Connection 1 • VTR: STOP (EE) • Input signal (ANALOG VIDEO IN): LINEARITY (SCH=0) • Switch/Jumper setting: Same as Sec. 14-2. • Control panel setting: Same as Sec. 14-2. • **MOUNTED CIRCUIT BOARD, AD-73 Sony part No. A-6019-054-A** ⊘RV7/AD-73 (C1): three o'clock position. • **MOUNTED CIRCUIT BOARD, AD-73 Sony part No. A-8275-659-A** ⊘RV7/AD-73 (B1): Mechanical Center • Waveform monitor	VIDEO OUTPUT 1  A=1.00±0.01V	**MOUNTED CIRCUIT BOARD, AD-73** **Sony part No. A-6019-054-A** ⊘ RV6/AD-73 (C14) **MOUNTED CIRCUIT BOARD, AD-73** **Sony part No. A-8275-659-A** ⊘ RV6/AD-73 (C16)

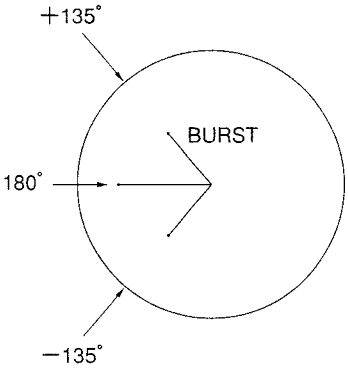
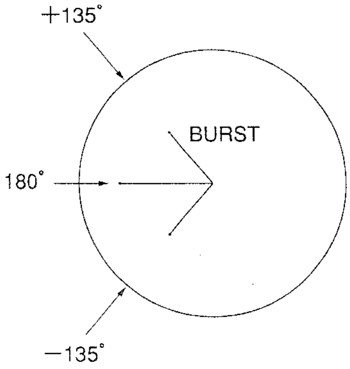
14-17. VIDEO A/D CONVERTER MATCHING ALIGNMENT (AD-73 board)

NOTE: This alignment is not necessary on the following board. **MOUNTED CIRCUIT BOARD, AD-73**
Sony part No. A-8275-659-A

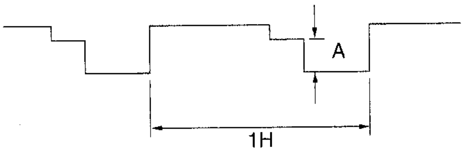
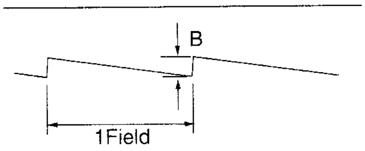
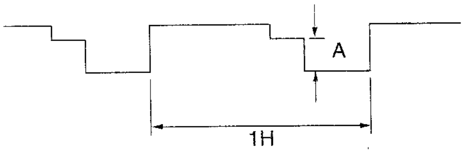
Conditions for alignment	Specifications	Adjustments
• Connection: 14-2. Connection 1 • VTR: STOP (EE) • Input signal (ANALOG VIDEO IN): H Sweep • Switch/Jumper setting: Same as Sec. 14-2. • Control panel setting: Same as Sec. 14-2. • Waveform monitor	VIDEO OUTPUT 1  0.5 to 6.0 MHz=Flat (Within ±2% based on 0.5 MHz.)	**DVR-20P: S/N 10001 to 10699** **DVR-28P: S/N 10001 to 10599** ⊘ RV1/AD-73 (B16) **DVR-20P: S/N 10701 to 11699** **DVR-28P: S/N 10601 to 11999** ⊘ RV1/AD-73 (A17)

14-18. VIDEO SAMPLING PHASE ALIGNMENT (AD-73 board)

NOTE: Alignments in Steps 2 and 3 are not necessary on the following sets. **DVR-20P: S/N 10701 and higher**
DVR-28P: S/N 12001 and higher

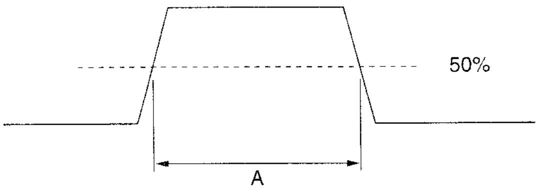
Conditions for alignment	Specifications	Adjustments
STEP 1. • Connection: 14-2. Connection 1 • VTR: STOP (EE) • Input signal (ANALOG VIDEO IN): Lineality (SCH=0) • Switch/Jumper setting: Same as Sec. 14-2. • Control panel setting: Same as Sec. 14-2. • **MOUNTED CIRCUIT BOARD, AD-73 Sony part No. A-6019-054-A** ⊘RV16/AD-73 (D1): Mechanical Center • **MOUNTED CIRCUIT BOARD, AD-73 Sony part No. A-8275-659-A** ⊘RV16/AD-73 (C1): Mechanical Center • Vectorscope	VIDEO OUTPUT 1 	**MOUNTED CIRCUIT BOARD, AD-73** **Sony part No. A-6019-054-A** ⊘ RV5/AD-73 (B17) **MOUNTED CIRCUIT BOARD, AD-73** **Sony part No. A-8275-659-A** ⊘ RV5/AD-73 (C25)
STEP 2. • Pull out the socket from JP1/AD-73 (C21) and insert it into JP2/AD-73 (C21). • Vectorscope	VIDEO OUTPUT 1 	⊘ RV9/AD-73 (E8)
STEP 3. • Pull out the socket from JP2/AD-73 (C21) and insert it into JP1/AD-73 (C21).		

14-19. CF ERROR DETECTION ALIGNMENT (AD-73 board)

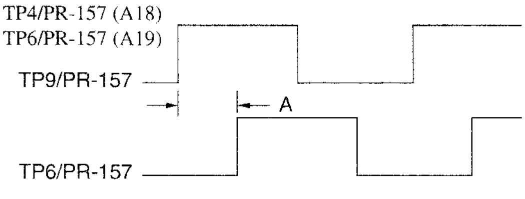
Conditions for alignment	Specifications	Adjustments
STEP 1. • Connection: 14-2. Connection 1 •VTR: STOP (EE) • Input signal (ANALOG VIDEO IN): Video signal with burst (SCH=0) • Switch/Jumper setting: S4-8/EN-99 (A19): OFF Other settings are the same as Sec. 14-2. • Control panel setting: Same as Sec. 14-2.	① **MOUNTED CIRCUIT BOARD, AD-73** **Sony part No. A-6019-054-A** TP2/AD-73 (G20) **MOUNTED CIRCUIT BOARD, AD-73** **Sony part No. A-8275-659-A** TP2/AD-73 (G21)  A=Minimum≃0	**MOUNTED CIRCUIT BOARD, AD-73** **Sony part No. A-6019-054-A** ⊘ RV11/AD-73 (G17) **MOUNTED CIRCUIT BOARD, AD-73** **Sony part No. A-8275-659-A** ⊘ RV11/AD-73 (J16)
	② **MOUNTED CIRCUIT BOARD, AD-73** **Sony part No. A-6019-054-A** TP2/AD-73 (G20) **MOUNTED CIRCUIT BOARD, AD-73** **Sony part No. A-8275-659-A** TP2/AD-73 (G21)  B=Minimum≃0	⊘ RV10/AD-73 (G14)
• Oscilloscope 1V/DIV, 10µS/DIV ① 500mV/DIV (AC), 5mS/DIV ② • Video picture monitor	Observing the video picture monitor, adjust so that the following data from 3E to 3F. Video picture monitor T*R. X X : X X : X X : X X VRF. 0000 F F F F F F F F ERR. X X X X F F F F F F F F SCH. OUT 20-80 IN 20-80 3Eh → 3Fh (Hex.)	⊘ RV13/AD-73 (G19)
STEP 2.	TP2/AD-73 (G20)  A=Maximum	**MOUNTED CIRCUIT BOARD, AD-73** **Sony part No. A-6019-054-A** ⊘ RV11/AD-73 (G17) **MOUNTED CIRCUIT BOARD, AD-73** **Sony part No. A-8275-659-A** ⊘ RV11/AD-73 (J16)
• Oscilloscope 1V/DIV 10µS/DIV • Video picture monitor	Observing the video picture monitor, adjust so that the following data from 01 to 00. Video picture monitor T*R. X X : X X : X X : X X VRF. 0000 F F F F F F F F ERR. X X X X F F F F F F F F SCH. OUT 20-80 IN 20-80 01h → 00h (Hex.)	**MOUNTED CIRCUIT BOARD, AD-73** **Sony part No. A-6019-054-A** ⊘ RV12/AD-73 (F19) **MOUNTED CIRCUIT BOARD, AD-73** **Sony part No. A-8275-659-A** ⊘ RV12/AD-73 (G20)

Conditions for alignment	Specifications	Adjustments
STEP 3. S4-8/EN-99 (A19): ON		
STEP 4. • Perform the following alignment 14-14. Input Video Signal Color Framing Alignment after making alignment.		

14-20. INPUT VIDEO SIGNAL SC-H PHASE ALIGNMENT (AD-73 board)

Conditions for alignment	Specifications	Adjustments
STEP 1. • Connection: 14-2. Connection 1 •VTR: STOP (EE) • Input signal (ANALOG VIDEO IN): Video signal with burst (SCH=0) • Switch/Jumper setting: S4-8/EN-99 (A19): OFF Other settings are the same as Sec. 14-2. • Control panel setting: Same as Sec. 14-2. • Oscilloscope 2V/DIV 50µS/DIV	**DVR-20P: S/N 10001 to 10699** **DVR-28P: S/N 10001 to 10599** IC45 pin 5/AD-73 (E11) **DVR-20P: S/N 10701 to 11699** **DVR-28P: S/N 10601 to 11999** TP11/AD-73 (E17) **MOUNTED CIRCUIT BOARD, AD-73** **Sony part No. A-8275-659-A** TP11/AD-73 (E13)  **DVR-20P: S/N 10001 to 10699** **DVR-28P: S/N 10001 to 10599** A=280±10 ns **DVR-20P: S/N 10701 to 11699** **DVR-28P: S/N 10601 to 11999** A=490±10 ns **MOUNTED CIRCUIT BOARD, AD-73** **Sony part No. A-8275-659-A** A=380±10 ns	**DVR-20P: S/N 10001 to 10699** **DVR-28P: S/N 10001 to 10599** ⊘ RV14/AD-73 (F9) **DVR-20P: S/N 10701 to 11699** **DVR-28P: S/N 10601 to 11999** ⊘ RV14/AD-73 (E17) **MOUNTED CIRCUIT BOARD, AD-73** **Sony part No. A-8275-659-A** ⊘ RV14/AD-73 (E13)
STEP 2. Fine alignment • Video picture monitor	While observing the video picture monitor, perform the alignment so that the displayed data falls between 1E and 21 (hexadecimal) of the figure below. Video picture monitor T*R. XX:XX:XX:XX VRF. 0000 FF FF FF FF ERR. XXXX FF FF FF FF SCH. OUT 20-80 IN 20-80 1Eh → 21h (Hex.)	**DVR-20P: S/N 10001 to 10699** **DVR-28P: S/N 10001 to 10599** ⊘ RV14/AD-73 (F9) **DVR-20P: S/N 10701 to 11699** **DVR-28P: S/N 10601 to 11999** ⊘ RV14/AD-73 (E17) **MOUNTED CIRCUIT BOARD, AD-73** **Sony part No. A-8275-659-A** ⊘ RV14/AD-73 (E13)
STEP 3. S4-8/EN-99 (A19): ON		
STEP 4. • Perform the following alignment 14-14. Input Video Signal Color Framing Alignment after making the alignment.		

14-21. INPUT VIDEO SIGNAL COLOR FRAMING ALIGNMENT (AD-73 board)

Conditions for alignment	Specifications	Adjustments
STEP 1. • Connection: 14-2. Connection 1 •VTR: STOP (EE) • Input signal (ANALOG VIDEO IN): Video signal with burst (SCH=0) • Switch/Jumper setting: S4-8/EN-99 (A19): OFF Other settings are the same as Sec. 14-2. • Control panel setting: Same as Sec. 14-2. • Video picture monitor	Video picture monitor T*R. XX:XX:XX:XX VRF. 0000 FF FF FF FF ERR. XXXX FF FF FF FF SCH. OUT 20-80 IN 20-80 1Dh → 23h (Hex.)	**MOUNTED CIRCUIT BOARD, AD-73** **Sony part No. A-6019-054-A** ⊘ RV11/AD-73 (G17) **MOUNTED CIRCUIT BOARD, AD-73** **Sony part No. A-8275-659-A** ⊘ RV11/AD-73 (J16)
STEP 2. • VTR: SYSTEM EE • Control panel setting; |TEST| , (PROC), (EE ON) • Waveform Monitor	 TP4/PR-157 (A18) TP6/PR-157 (A19) TP9/PR-157 A TP6/PR-157 A≒20.0 ms	⊘ RV11/AD-73 (G17) Perform STEP 1 after adjusting. ⊘ RV11/AD-73 (G17), so that the specification be satisfied.
STEP 3. S4-8/EN-99 (A19): ON		

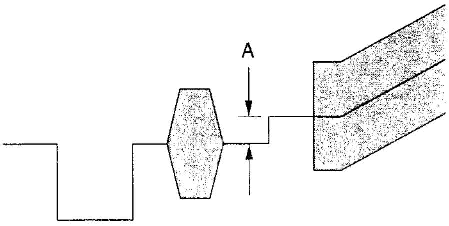
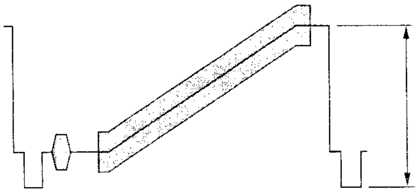
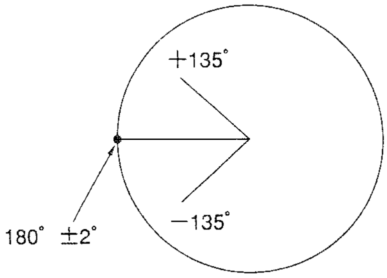
14-22. INTERNAL FREQUENCY ALIGNMENT (AD-73 board)

NOTE: This alignment is not necessary on the following sets. **DVR-20P: S/N 10701 and higher**
DVR-28P: S/N 10601 and higher

Conditions for alignment	Specifications	Adjustments
STEP 1. • Connection: 14-2. Connection 1 •VTR: STOP (EE) • Input signal (ANALOG VIDEO IN): Video signal with burst (SCH=0) • Switch/Jumper setting: Same as Sec. 14-2. • Control panel setting: Same as Sec. 14-2. • Oscilloscope 1V/DIV 20µS/DIV	TP7/AD-73 (D14)=A[V]	
STEP 2. • Disconnect the input signal. (or power off SG) • Waveform Monitor	TP7/AD-73 (D14)=A±10 mV	⊘ RV8/AD-73 (E13)

14-23. MULTI-LOOPTEST USING ALIGNMENT (AD-73 board)

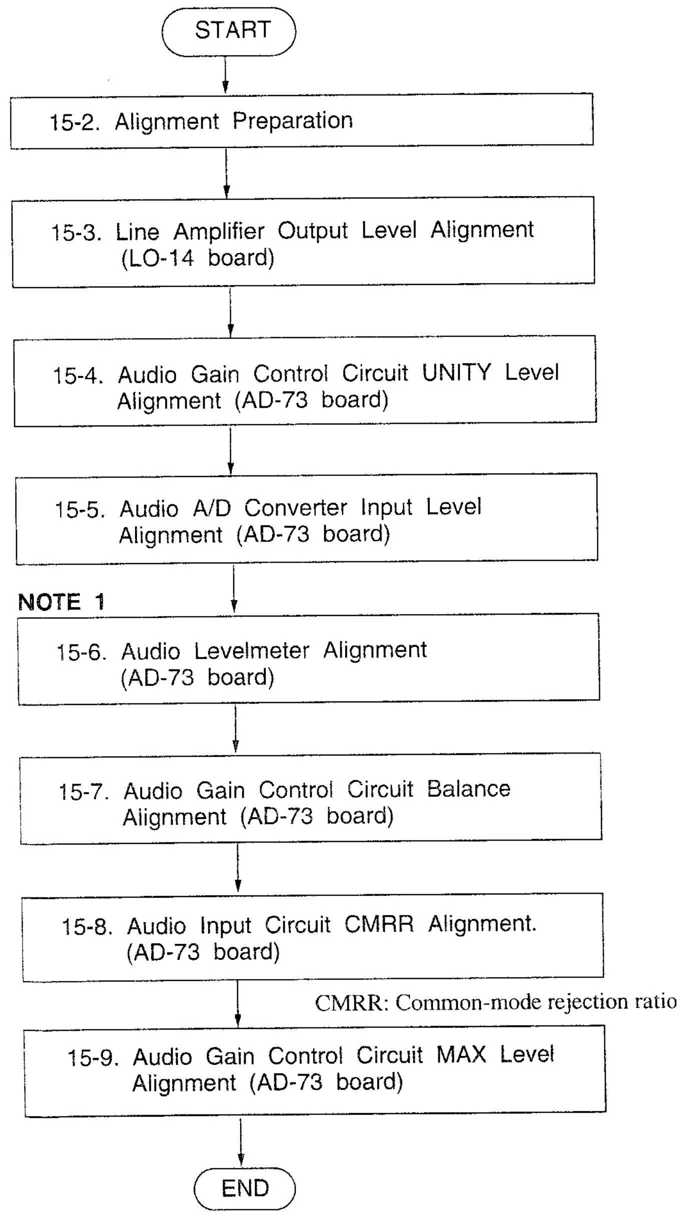
NOTE: Alignment in Step 1 is not necessary on the following board. **MOUNTED CIRCUIT BOARD, AD-73**
Sony part No. A-8275-659-A

Conditions for alignment	Specifications	Adjustments
STEP 1. • Connection: 14-2. Connection 3 • Insert AD-73 board to the unit. • VTR: STOP (EE) • Switch/Jumper setting: Same as Sec. 14-2. • Control panel setting: TEST , (MULTI): Set the multi-looptest menu. (SOURCE): INT SG. → INT SG6 (MOD RAMP) Push the (Loop) and select ten times. Push EXCUTE and perform multi-looptest. Other settings are the same as Sec. 14-2. • Waveform Monitor	VIDEO OUTPUT 1 	⊘RV17/AD-73 (D1) (BLACK LEVEL Adjustment)
STEP 2. • VTR: STOP (EE) • Waveform Monitor	VIDEO OUTPUT 1  A=1.00±0.01V	**MOUNTED CIRCUIT BOARD, AD-73** **Sony part No. A-6019-054-A** ⊘RV7/AD-73 (C1) (LEVEL Adjustment) **MOUNTED CIRCUIT BOARD, AD-73** **Sony part No. A-8275-659-A** ⊘RV7/AD-73 (B1) (LEVEL Adjustment)
STEP 3. • VTR: STOP (EE) • Vectorscope	VIDEO OUTPUT 1 	**MOUNTED CIRCUIT BOARD, AD-73** **Sony part No. A-6019-054-A** ⊘RV16/AD-73 (D1) (B/C Phase Adjustment) **MOUNTED CIRCUIT BOARD, AD-73** **Sony part No. A-8275-659-A** ⊘RV16/AD-73 (C1) (B/C Phase Adjustment)

SECTION 15
AUDIO SIGNAL SYSTEM ALIGNMENT

DVR-20 : S/N 10001 to 13099
DVR-20P : S/N 10001 to 11699
DVR-28 : S/N 10001 to 12410
DVR-28P : S/N 10001 to 11999

15-1. ALIGNMENT SEQENCE


START
15-2. Alignment Preparation
15-3. Line Amplifier Output Level Alignment (LO-14 board)
15-4. Audio Gain Control Circuit UNITY Level Alignment (AD-73 board)
15-5. Audio A/D Converter Input Level Alignment (AD-73 board)
NOTE 1
15-6. Audio Levelmeter Alignment (AD-73 board)
15-7. Audio Gain Control Circuit Balance Alignment (AD-73 board)
15-8. Audio Input Circuit CMRR Alignment. (AD-73 board)
CMRR: Common-mode rejection ratio
15-9. Audio Gain Control Circuit MAX Level Alignment (AD-73 board)
END

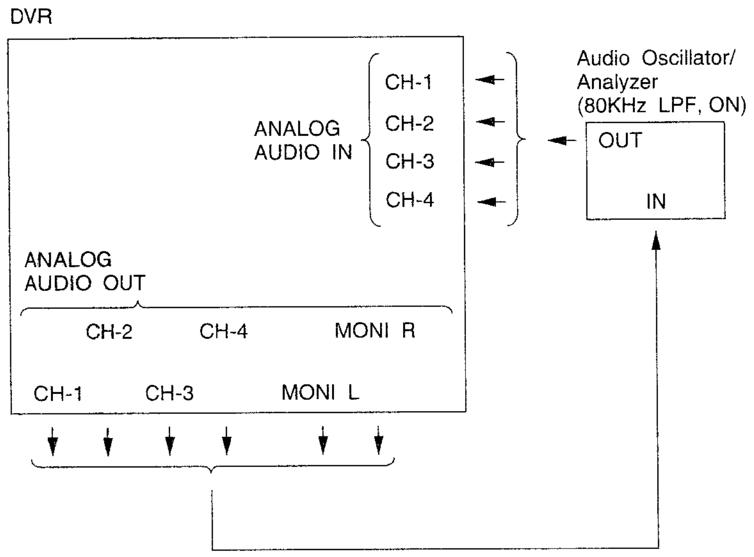
NOTE 1: The alignment is not necessary on the following sets.
DVR-20: S/N 10001 to 10999
DVR-20P: S/N 10001 to 10699
DVR-28: S/N 10001 to 10699
DVR-28P: S/N 10001 to 10599

15-2. ALIGNMENT PREPARATION

[Equipment Required]

- Audio Oscillator/Analyzer: (Eguivalent product: TM5006/ Tektromix)

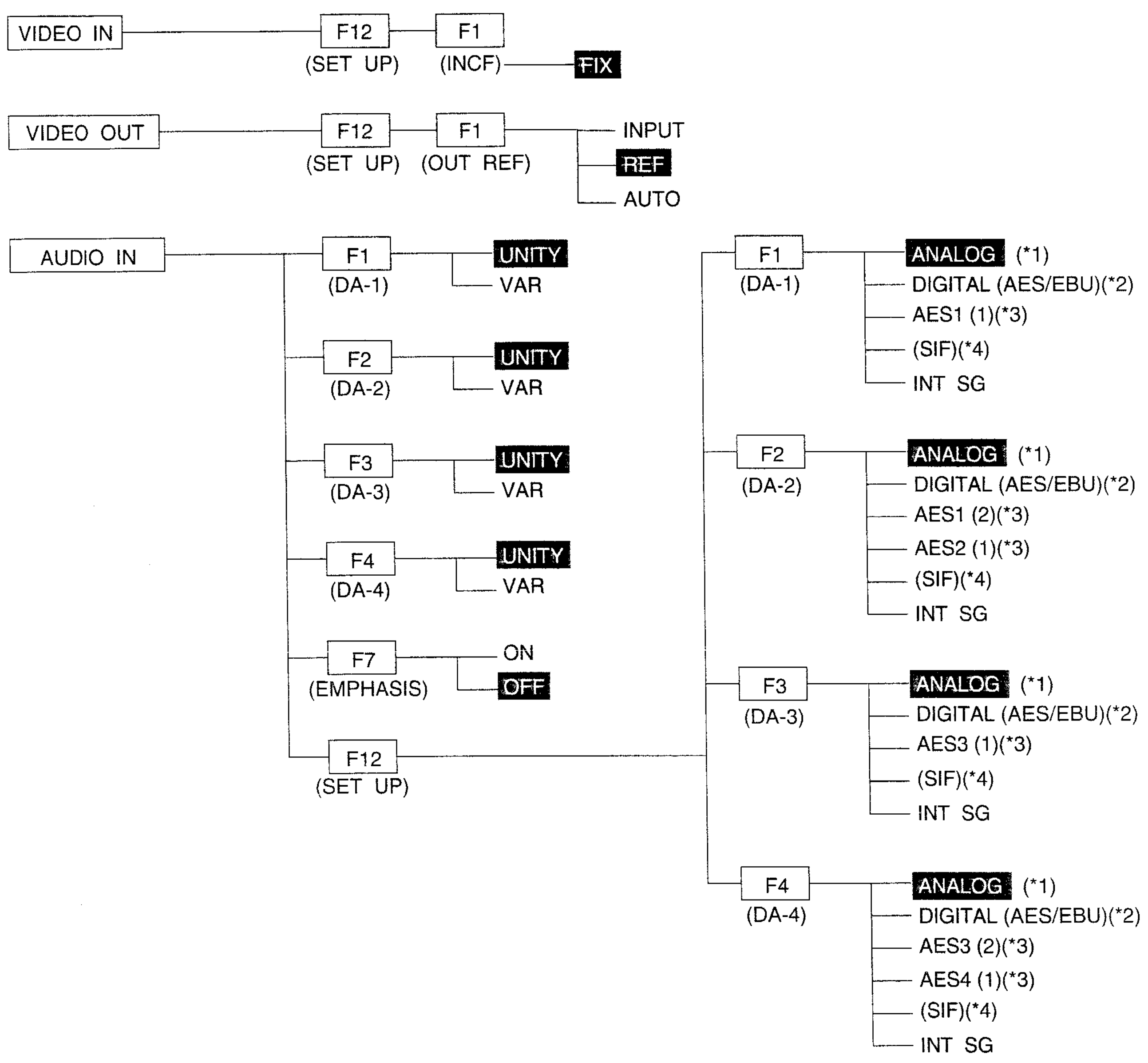
[Equipment Connection]

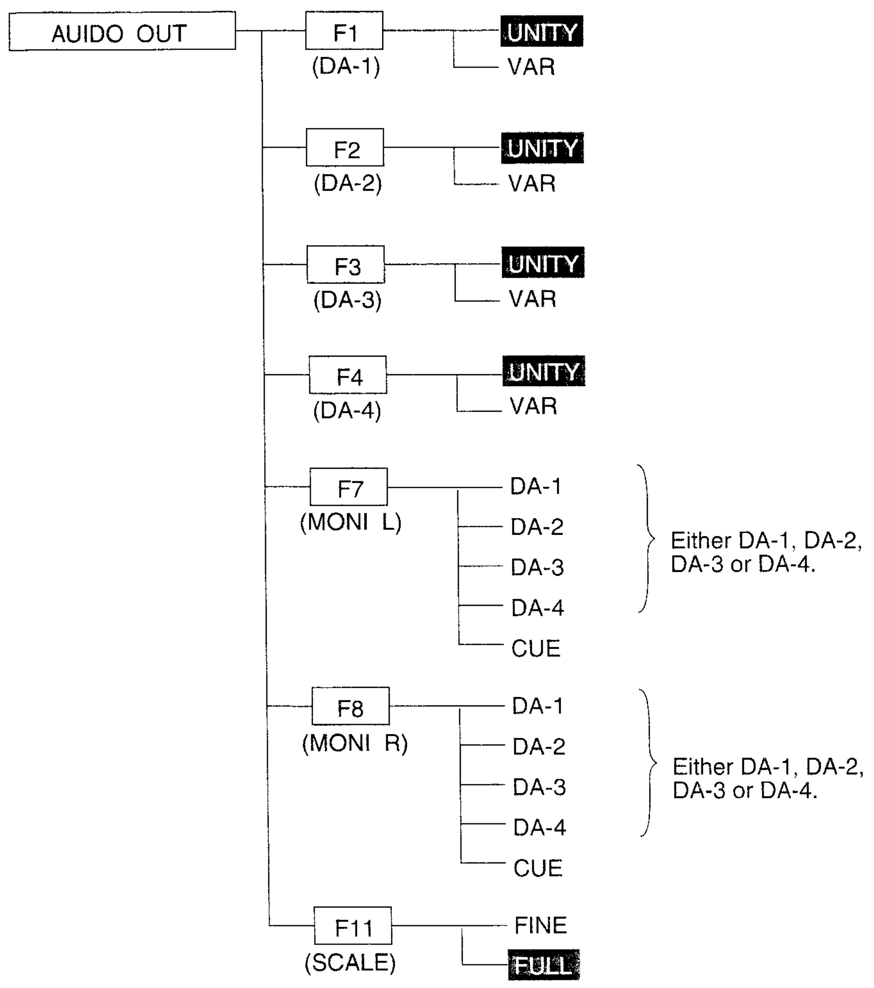

DVR
ANALOG AUDIO IN
CH-1
CH-2
CH-3
CH-4
ANALOG AUDIO OUT
CH-2
CH-4
MONI R
CH-1
CH-3
MONI L
Audio Oscillator/ Analyzer (80KHz LPF, ON)
OUT
IN

[Control panel setting]

■ : Indications when selecting the initial settings

BKDV-101


VIDEO IN
F12
(SET UP)
F1
(INCF)
FIX
VIDEO OUT
F12
(SET UP)
F1
(OUT REF)
INPUT
REF
AUTO
AUDIO IN
F1
(DA-1)
UNITY
VAR
F2
(DA-2)
UNITY
VAR
F3
(DA-3)
UNITY
VAR
F4
(DA-4)
UNITY
VAR
F7
(EMPHASIS)
ON
OFF
F12
(SET UP)
F1
(DA-1)
ANALOG (*1)
DIGITAL (AES/EBU)(*2)
AES1 (1)(*3)
(SIF)(*4)
INT SG
F2
(DA-2)
ANALOG (*1)
DIGITAL (AES/EBU)(*2)
AES1 (2)(*3)
AES2 (1)(*3)
(SIF)(*4)
INT SG
F3
(DA-3)
ANALOG (*1)
DIGITAL (AES/EBU)(*2)
AES3 (1)(*3)
(SIF)(*4)
INT SG
F4
(DA-4)
ANALOG (*1)
DIGITAL (AES/EBU)(*2)
AES3 (2)(*3)
AES4 (1)(*3)
(SIF)(*4)
INT SG


AUIDO OUT
F1
(DA-1)
UNITY
VAR
F2
(DA-2)
UNITY
VAR
F3
(DA-3)
UNITY
VAR
F4
(DA-4)
UNITY
VAR
F7
(MONI L)
DA-1
DA-2
DA-3
DA-4
CUE
Either DA-1, DA-2, DA-3 or DA-4.
F8
(MONI R)
DA-1
DA-2
DA-3
DA-4
CUE
Either DA-1, DA-2, DA-3 or DA-4.
F11
(SCALE)
FINE
FULL

*1. In the DVR-C20/C20P, ANALOG mode cannot be selected.

*2. Indications in parentheses can be selected only when BKDV-205/206 is inserted for DVR-20/C20/20P/C20P

*3. Indications for DVR-28/28P

*4. Indications in parentheses can be selected only when SERIAL INTERFACE BOARD (optional accessory) is inserted.

SERIAL INTERFACE BOARD :
- BKDV-105 : Corresponding to DVR-28
- BKDV-106 : Corresponding to DVR-28P
- BKDV-205 : Corresponding to DVR-20/C20
- BKDV-206 : Corresponding to DVR-20P/C20P

[Switch/Jumper Initial Setting]

AD-73 Board
DVR-20: S/N 10001 to 10999
DVR-20P: S/N 10001 to 10699
DVR-28: S/N 10001 to 10699
DVR-28P: S/N 10001 to 10599

JP1/2..................................JP1
JP201, 301, 401, 501.........SHORT
JP202, 302, 402, 502.........OPEN
JP203, 303, 403, 503.........OPEN
JP204, 304, 404, 504.........OPEN
JP205, 305, 405, 505.........SHORT
JP206, 306, 406, 506.........OPEN
JP207, 307, 407, 507.........OPEN

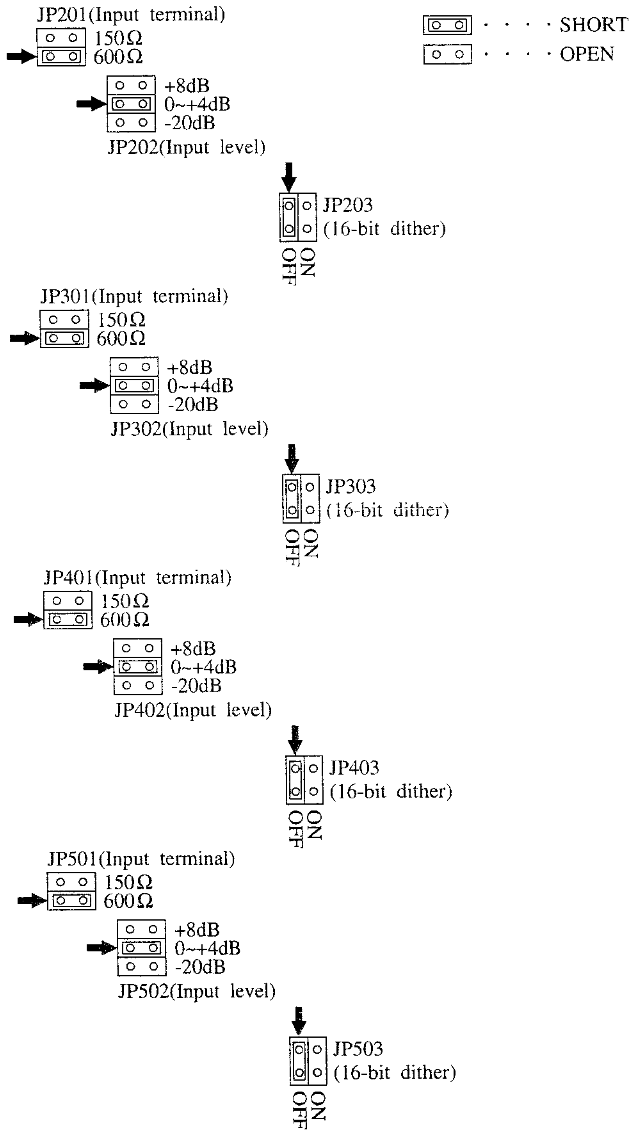
LO-14 Board

SL1.............OPEN
SL2.............OPEN
SL3.............OPEN
SL4.............OPEN
SL5.............OPEN
SL6.............OPEN
SL7.............OPEN
SL8.............OPEN
SL9.............OPEN
SL10...........OPEN
SL11...........OPEN
SL12...........OPEN

AD-73 board
DVR-20: S/N 11001 and higher
DVR-20P: S/N 10701 and higher
DVR-28: S/N 10701 and higher
DVR-28P: S/N 10601 and higher

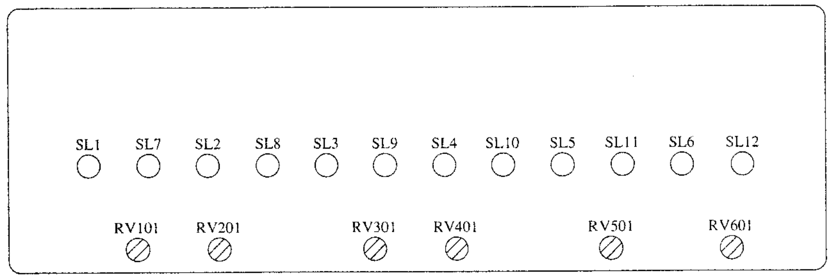
JP201, 301, 401, 501
Input terminal...................................600 Ω
JP202, 302, 402, 502
Input level..0~+4 dB
JP203, 303, 403, 503
16-bit dither.....................................OFF

The jumper initial setting is set to the following arrow position.


· · · · SHORT
· · · · OPEN
JP201(Input terminal)
150Ω
600Ω
+8dB
0~+4dB
-20dB
JP202(Input level)
JP203
(16-bit dither)
ON
OFF
JP301(Input terminal)
150Ω
600Ω
+8dB
0~+4dB
-20dB
JP302(Input level)
JP303
(16-bit dither)
ON
OFF
JP401(Input terminal)
150Ω
600Ω
+8dB
0~+4dB
-20dB
JP402(Input level)
JP403
(16-bit dither)
ON
OFF
JP501(Input terminal)
150Ω
600Ω
+8dB
0~+4dB
-20dB
JP502(Input level)
JP503
(16-bit dither)
ON
OFF

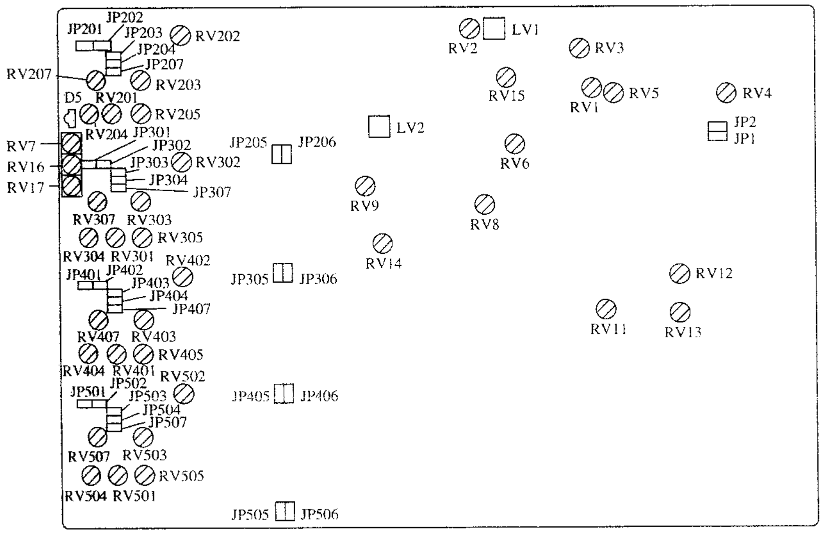
[Location]

LO-14 Board


SL1
SL7
SL2
SL8
SL3
SL9
SL4
SL10
SL5
SL11
SL6
SL12
RV101
RV201
RV301
RV401
RV501
RV601

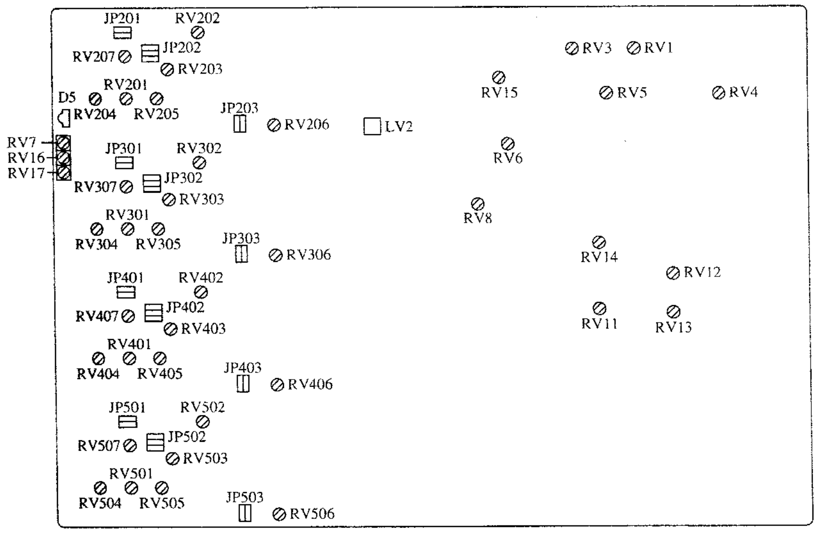
B SIDE

AD-73 Board DVR-20: S/N 10001 to 10999 DVR-28: S/N 10001 to 10699 DVR-20P: S/N 10001 to 10699 DVR-28P: S/N 10001 to 10599


JP201
JP202
JP203
RV202
JP204
JP207
RV203
RV207
D5
RV201
RV205
RV204
JP301
JP302
JP303
RV302
JP304
JP307
RV7
RV16
RV17
RV307
RV303
RV304
RV301
RV305
JP401
JP402
RV402
JP403
JP404
JP407
RV407
RV403
RV404
RV401
RV405
JP501
JP502
RV502
JP503
JP504
JP507
RV507
RV503
RV504
RV501
RV505
JP205
JP206
JP305
JP306
JP405
JP406
JP505
JP506
LV1
LV2
RV2
RV3
RV15
RV1
RV5
RV4
JP2
JP1
RV6
RV9
RV8
RV14
RV12
RV11
RV13

A SIDE

AD-73 Board DVR-20: S/N 11001 and higher DVR-28: S/N 10701 and higher DVR-20P: S/N 10701 and higher DVR-28P: S/N 10601 and higher

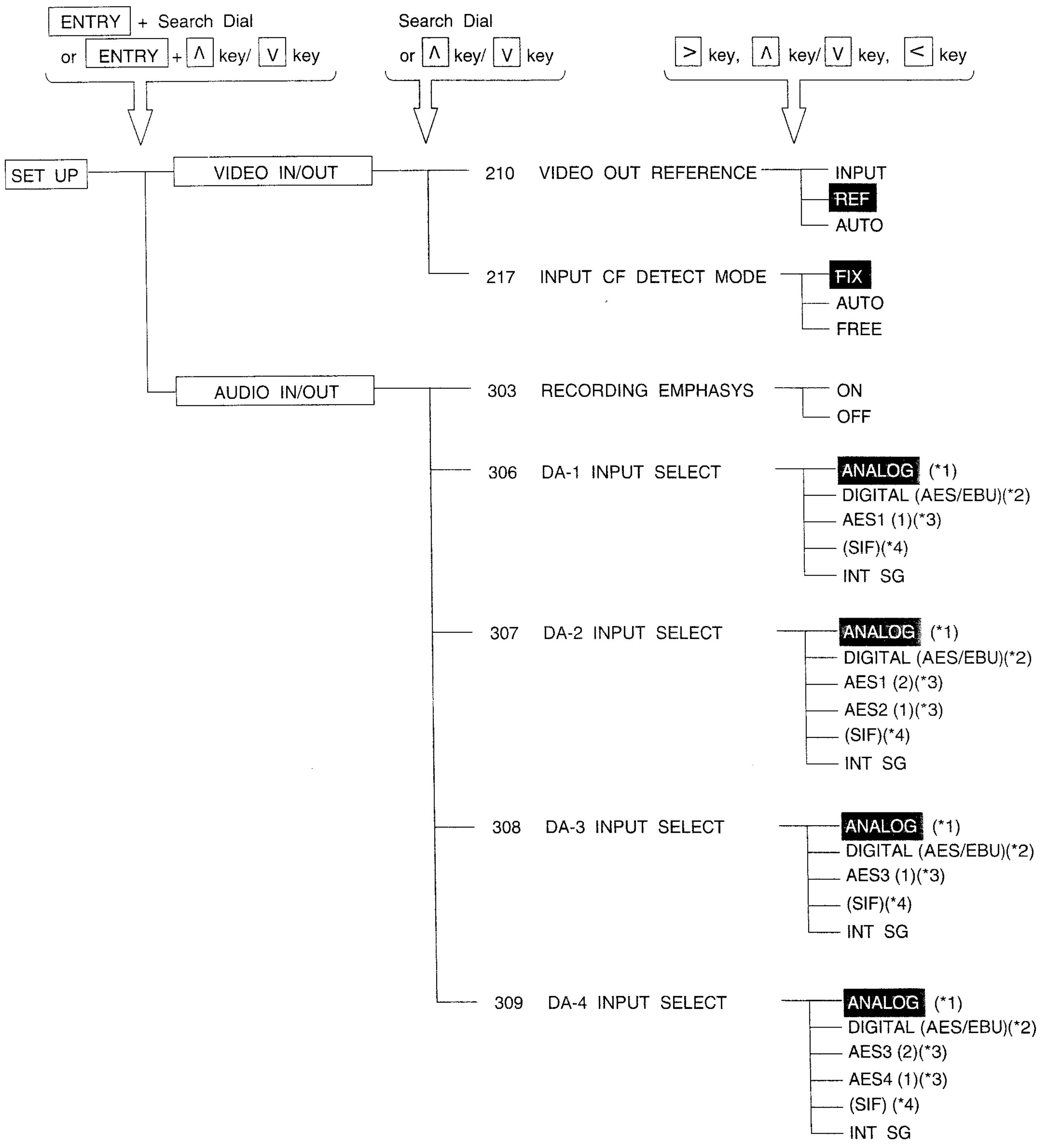

JP201
RV202
RV207
JP202
RV203
D5
RV201
RV204
RV205
JP203
RV206
LV2
RV7
RV16
RV17
JP301
RV302
RV307
JP302
RV303
RV301
RV304
RV305
JP303
RV306
JP401
RV402
RV407
JP402
RV403
RV401
RV404
RV405
JP403
RV406
JP501
RV502
RV507
JP502
RV503
RV501
RV504
RV505
JP503
RV506
RV3
RV1
RV15
RV5
RV4
RV6
RV8
RV14
RV12
RV11
RV13

A SIDE

[Control panel setting]

■ : Indications when selecting the initial settings

BKDV-202



- SET UP
  - VIDEO IN/OUT
    - 210 VIDEO OUT REFERENCE
      - INPUT
      - **REF**
      - AUTO
    - 217 INPUT CF DETECT MODE
      - **FIX**
      - AUTO
      - FREE
  - AUDIO IN/OUT
    - 303 RECORDING EMPHASYS
      - ON
      - OFF
    - 306 DA-1 INPUT SELECT
      - **ANALOG** (*1)
      - DIGITAL (AES/EBU)(*2)
      - AES1 (1)(*3)
      - (SIF)(*4)
      - INT SG
    - 307 DA-2 INPUT SELECT
      - **ANALOG** (*1)
      - DIGITAL (AES/EBU)(*2)
      - AES1 (2)(*3)
      - AES2 (1)(*3)
      - (SIF)(*4)
      - INT SG
    - 308 DA-3 INPUT SELECT
      - **ANALOG** (*1)
      - DIGITAL (AES/EBU)(*2)
      - AES3 (1)(*3)
      - (SIF)(*4)
      - INT SG
    - 309 DA-4 INPUT SELECT
      - **ANALOG** (*1)
      - DIGITAL (AES/EBU)(*2)
      - AES3 (2)(*3)
      - AES4 (1)(*3)
      - (SIF) (*4)
      - INT SG

• REC level control knob	DA-1	Push it in	**UNITY**
		Pull it out	VARIABLE
• REC level control knob	DA-2	Push it in	**UNITY**
		Pull it out	VARIABLE
• REC level control knob	DA-3	Push it in	**UNITY**
		Pull it out	VARIABLE
• REC level control knob	DA-4	Push it in	**UNITY**
		Pull it out	VARIABLE
• PB level control knob	DA-1	Push it in	**UNITY**
		Pull it out	VARIABLE
• PB level control knob	DA-2	Push it in	**UNITY**
		Pull it out	VARIABLE
• PB level control knob	DA-3	Push it in	**UNITY**
		Pull it out	VARIABLE
• PB level control knob	DA-4	Push it in	**UNITY**
		Pull it out	VARIABLE
• PB level control knob	CUE	Push it in	**UNITY**
		Pull it out	VARIABLE

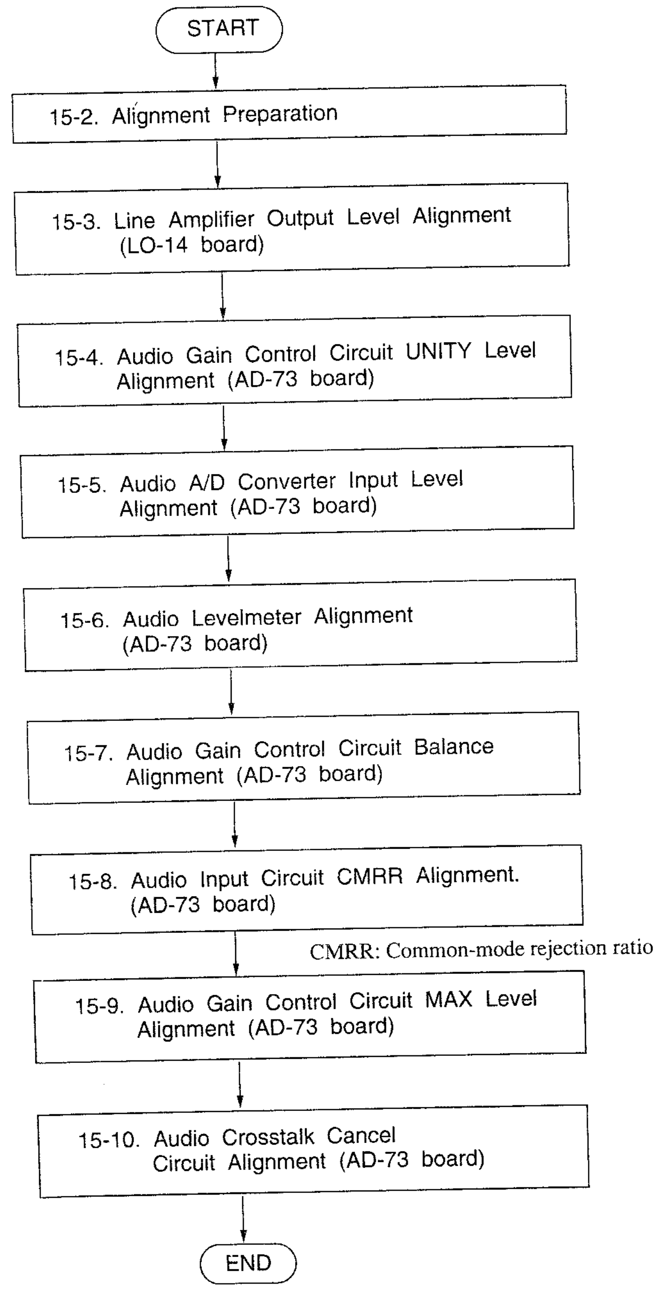
- Press one of the keys, DA1-DA4, located on the left side of the audio monitor channel selection key block.
- Press one of the keys, DA1-DA4, on the right side of the audio monitor channel selection key block.
- FINE/FULL button/lamp
  - FINE
  - FULL

*1. In the DVR-C20/C20P, ANALOG mode cannot be selected.
*2. Indications in parenthes can be selected only when BKDV-205/206 is inserted for DVR-20/C20/20P/C20P.
*3. Indications for DVR-28/28P
*4. Indications in parenthes can be selected only when SERIAL INTERFACE BOARD (optional accessory) is inserted.

SERIAL INTERFACE BOARD :
BKDV-105 : Corresponding to DVR-28
BKDV-106 : Corresponding to DVR-28P
BKDV-205 : Corresponding to DVR-20/C20
BKDV-206 : Corresponding to DVR-20P/C20P

DVR-20 : S/N 13101 and higher
DVR-20P : S/N 11701 and higher
DVR-28 : S/N 12411 and higher
DVR-28P : S/N 12001 and higher

15-1. ALIGNMENT SEQENCE


START
15-2. Alignment Preparation
15-3. Line Amplifier Output Level Alignment (LO-14 board)
15-4. Audio Gain Control Circuit UNITY Level Alignment (AD-73 board)
15-5. Audio A/D Converter Input Level Alignment (AD-73 board)
15-6. Audio Levelmeter Alignment (AD-73 board)
15-7. Audio Gain Control Circuit Balance Alignment (AD-73 board)
15-8. Audio Input Circuit CMRR Alignment. (AD-73 board)
15-9. Audio Gain Control Circuit MAX Level Alignment (AD-73 board)
15-10. Audio Crosstalk Cancel Circuit Alignment (AD-73 board)
END

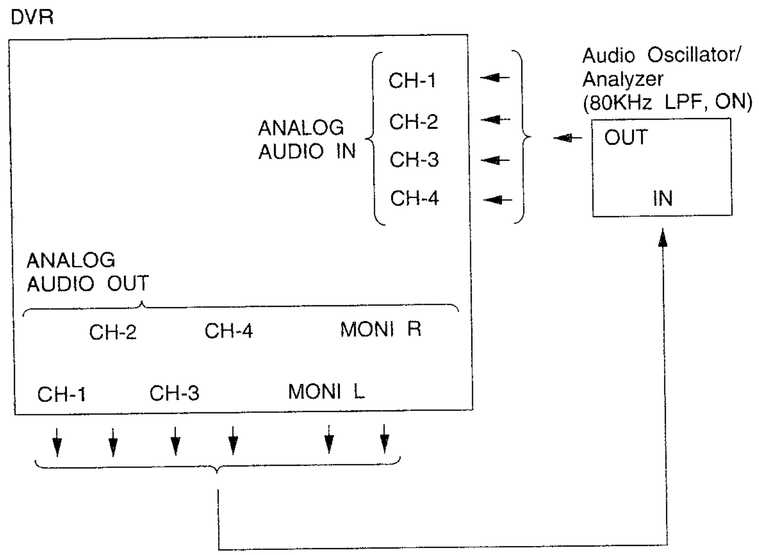
CMRR: Common-mode rejection ratio

15-2. ALIGNMENT PREPARATION

[Equipment Required]

- Audio Oscillator/Analyzer: (Eguivalent product: TM5006/ Tektromix)

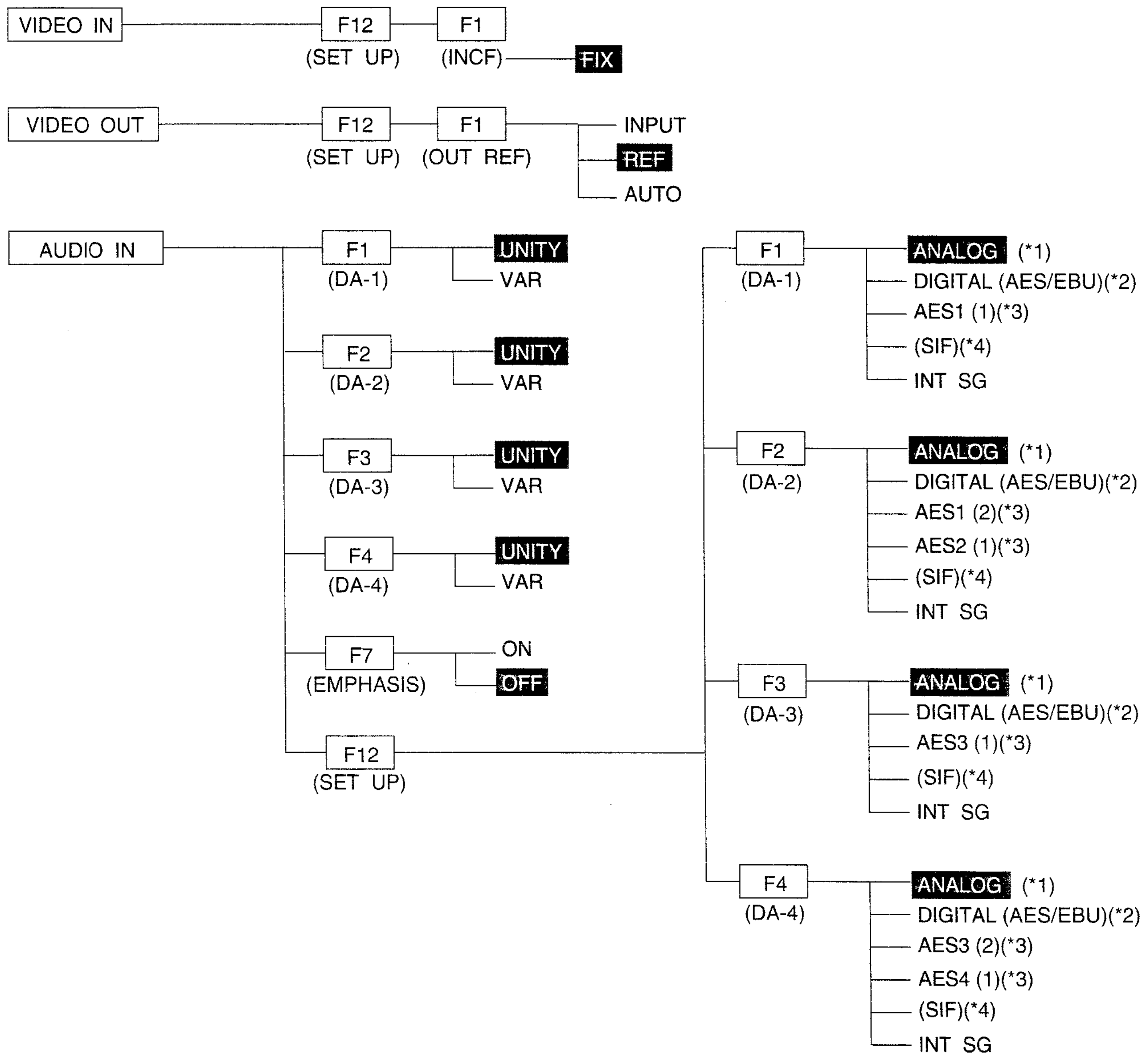
[Equipment Connection]


DVR
ANALOG AUDIO IN
CH-1
CH-2
CH-3
CH-4
ANALOG AUDIO OUT
CH-2
CH-4
MONI R
CH-1
CH-3
MONI L
Audio Oscillator/ Analyzer (80KHz LPF, ON)
OUT
IN

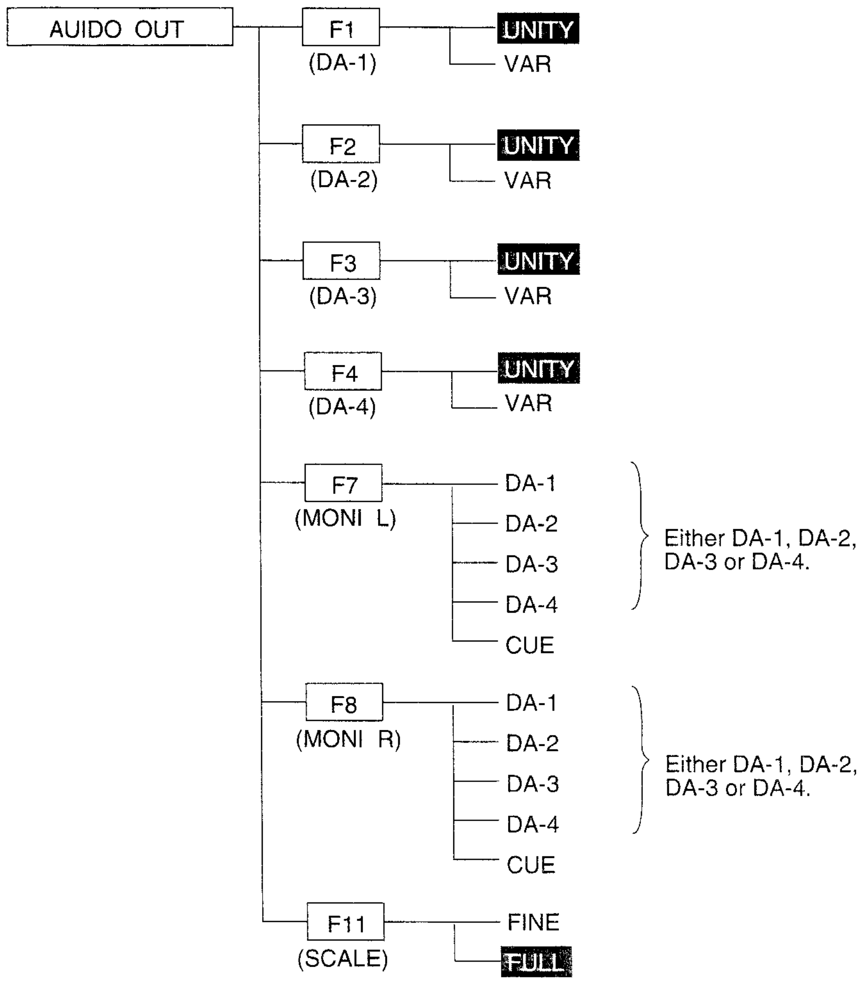
[Control panel setting]

▇ : Indications when selecting the initial settings

BKDV-101



VIDEO IN
F12
(SET UP)
F1
(INCF)
FIX
VIDEO OUT
F12
(SET UP)
F1
(OUT REF)
INPUT
REF
AUTO
AUDIO IN
F1
(DA-1)
UNITY
VAR
F2
(DA-2)
UNITY
VAR
F3
(DA-3)
UNITY
VAR
F4
(DA-4)
UNITY
VAR
F7
(EMPHASIS)
ON
OFF
F12
(SET UP)
F1
(DA-1)
ANALOG (*1)
DIGITAL (AES/EBU)(*2)
AES1 (1)(*3)
(SIF)(*4)
INT SG
F2
(DA-2)
ANALOG (*1)
DIGITAL (AES/EBU)(*2)
AES1 (2)(*3)
AES2 (1)(*3)
(SIF)(*4)
INT SG
F3
(DA-3)
ANALOG (*1)
DIGITAL (AES/EBU)(*2)
AES3 (1)(*3)
(SIF)(*4)
INT SG
F4
(DA-4)
ANALOG (*1)
DIGITAL (AES/EBU)(*2)
AES3 (2)(*3)
AES4 (1)(*3)
(SIF)(*4)
INT SG



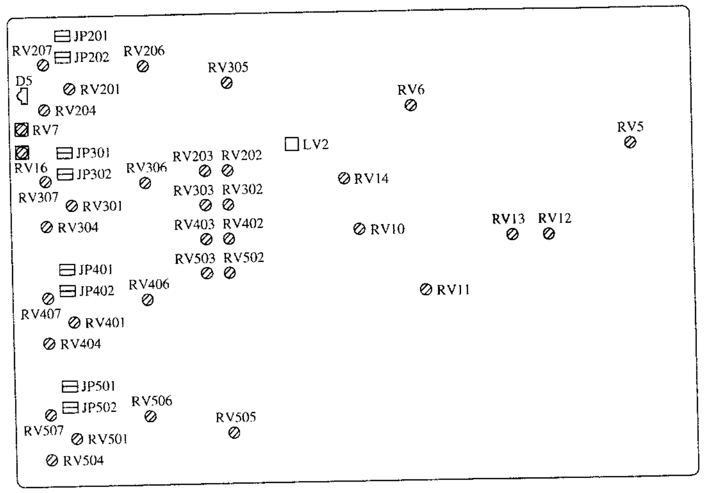
AUIDO OUT
F1
(DA-1)
UNITY
VAR
F2
(DA-2)
UNITY
VAR
F3
(DA-3)
UNITY
VAR
F4
(DA-4)
UNITY
VAR
F7
(MONI L)
DA-1
DA-2
DA-3
DA-4
CUE
Either DA-1, DA-2, DA-3 or DA-4.
F8
(MONI R)
DA-1
DA-2
DA-3
DA-4
CUE
Either DA-1, DA-2, DA-3 or DA-4.
F11
(SCALE)
FINE
FULL

*1. In the DVR-C20/C20P, ANALOG mode cannot be selected.
*2. Indications in parentheses can be selected only when BKDV-205/206 is inserted for DVR-20/C20/20P/C20P
*3. Indications for DVR-28/28P
*4. Indications in parentheses can be selected only when SERIAL INTERFACE BOARD (optional accessory) is inserted.

SERIAL INTERFACE BOARD :
BKDV-105 : Corresponding to DVR-28
BKDV-106 : Corresponding to DVR-28P
BKDV-205 : Corresponding to DVR-20/C20
BKDV-206 : Corresponding to DVR-20P/C20P

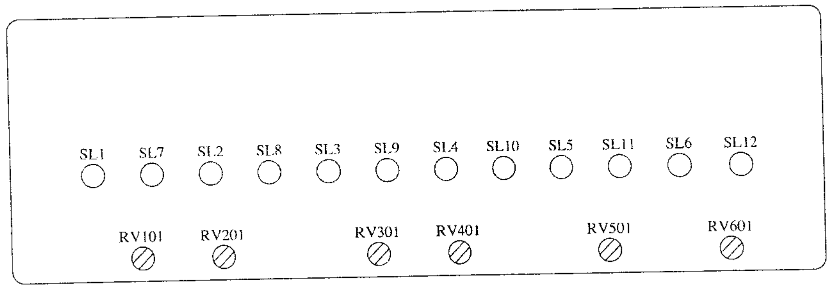
[Location]

AD-73 Board DVR-20: S/N 13101 and higher
DVR-20P: S/N 11701 and higher
DVR-28: S/N 12411 and higher
DVR-28P: S/N 12001 and higher


JP201
RV207
JP202
RV206
RV305
D5
RV201
RV204
RV6
RV7
RV5
JP301
LV2
RV203
RV202
RV16
JP302
RV306
RV14
RV303
RV302
RV307
RV301
RV304
RV403
RV402
RV10
RV13
RV12
RV503
RV502
JP401
JP402
RV406
RV11
RV407
RV401
RV404
JP501
JP502
RV506
RV505
RV507
RV501
RV504

A SIDE

LO-14 Board

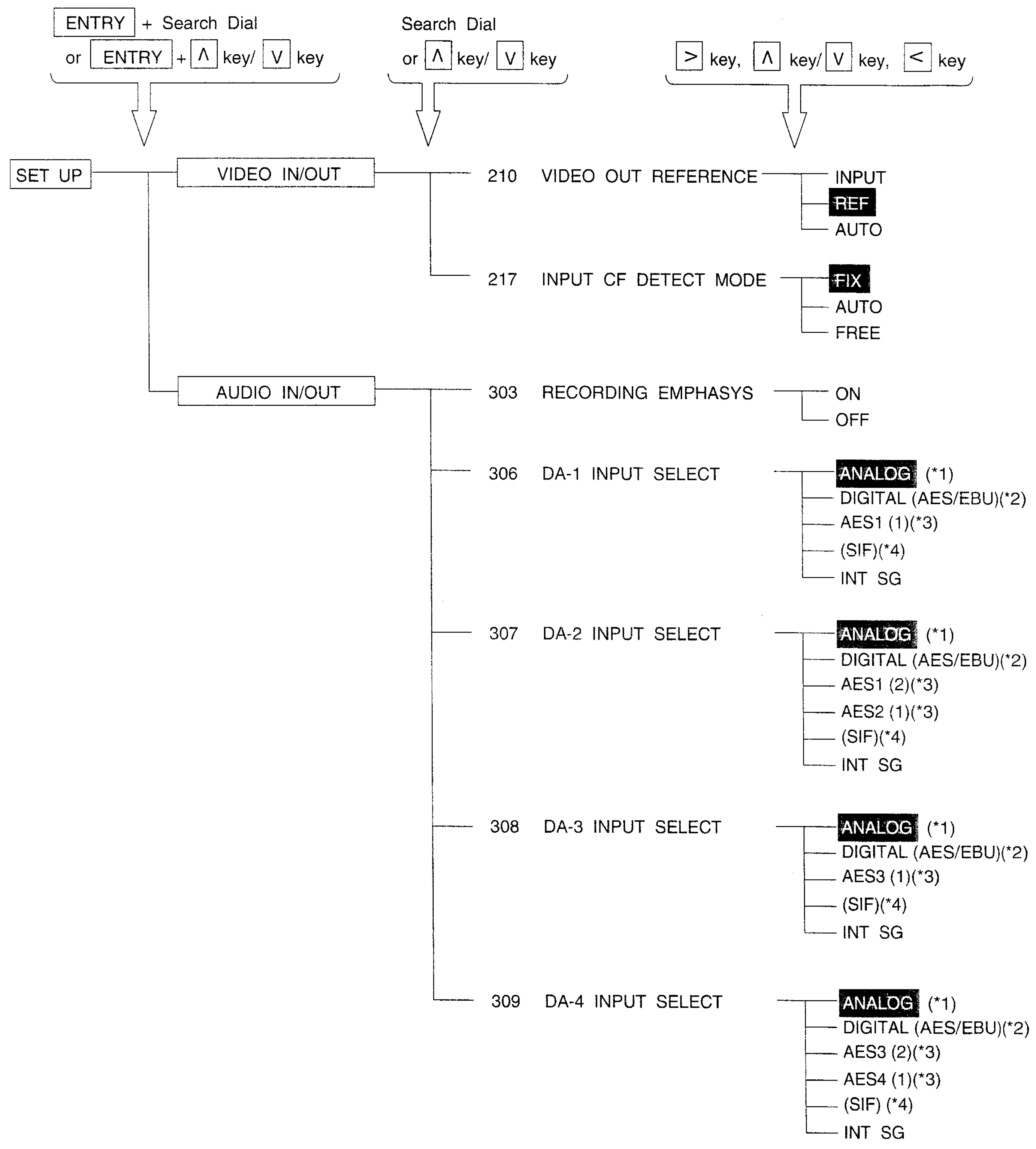

SL1
SL7
SL2
SL8
SL3
SL9
SL4
SL10
SL5
SL11
SL6
SL12
RV101
RV201
RV301
RV401
RV501
RV601

B SIDE

[Control panel setting]

■ : Indications when selecting the initial settings

BKDV-202


ENTRY + Search Dial
or ENTRY + Λ key/ V key
Search Dial
or Λ key/ V key
> key, Λ key/ V key, < key
SET UP
VIDEO IN/OUT
210 VIDEO OUT REFERENCE
INPUT
REF
AUTO
217 INPUT CF DETECT MODE
FIX
AUTO
FREE
AUDIO IN/OUT
303 RECORDING EMPHASYS
ON
OFF
306 DA-1 INPUT SELECT
ANALOG (*1)
DIGITAL (AES/EBU)(*2)
AES1 (1)(*3)
(SIF)(*4)
INT SG
307 DA-2 INPUT SELECT
ANALOG (*1)
DIGITAL (AES/EBU)(*2)
AES1 (2)(*3)
AES2 (1)(*3)
(SIF)(*4)
INT SG
308 DA-3 INPUT SELECT
ANALOG (*1)
DIGITAL (AES/EBU)(*2)
AES3 (1)(*3)
(SIF)(*4)
INT SG
309 DA-4 INPUT SELECT
ANALOG (*1)
DIGITAL (AES/EBU)(*2)
AES3 (2)(*3)
AES4 (1)(*3)
(SIF) (*4)
INT SG

• REC level control knob	DA-1	Push it in	**UNITY**
		Pull it out	VARIABLE
• REC level control knob	DA-2	Push it in	**UNITY**
		Pull it out	VARIABLE
• REC level control knob	DA-3	Push it in	**UNITY**
		Pull it out	VARIABLE
• REC level control knob	DA-4	Push it in	**UNITY**
		Pull it out	VARIABLE
• PB level control knob	DA-1	Push it in	**UNITY**
		Pull it out	VARIABLE
• PB level control knob	DA-2	Push it in	**UNITY**
		Pull it out	VARIABLE
• PB level control knob	DA-3	Push it in	**UNITY**
		Pull it out	VARIABLE
• PB level control knob	DA-4	Push it in	**UNITY**
		Pull it out	VARIABLE
• PB level control knob	CUE	Push it in	**UNITY**
		Pull it out	VARIABLE

- Press one of the keys, DA1-DA4, located on the left side of the audio monitor channel selection key block.
- Press one of the keys, DA1-DA4, on the right side of the audio monitor channel selection key block.
- FINE/FULL button/lamp — FINE / FULL

*1. In the DVR-C20/C20P, ANALOG mode cannot be selected.
*2. Indications in parenthes can be selected only when BKDV-205/206 is inserted for DVR-20/C20/20P/C20P.
*3. Indications for DVR-28/28P
*4. Indications in parenthes can be selected only when SERIAL INTERFACE BOARD (optional accessory) is inserted.

SERIAL INTERFACE BOARD :
BKDV-105 : Corresponding to DVR-28
BKDV-106 : Corresponding to DVR-28P
BKDV-205 : Corresponding to DVR-20/C20
BKDV-206 : Corresponding to DVR-20P/C20P

15-3. LINE AMPLIFIER OUTPUT LEVEL ALIGNMENT (LO-14 board)

Conditions for alignment	Specifications	Adjustments
• Connection: Same as Sec. 15-2. • VTR: STOP (EE) • Switch/Jumper setting: Same as Sec. 15-2. • Control panel setting: SET UP/AUDIO IN (DA-1) → INT SG (DA-2) → INT SG (DA-3) → INT SG (DA-4) → INT SG Other settings are same as Sec. 15-2.	ANALOG AUDIO OUTPUT CH-1=+8.0±0.1 dBm	⊘ RV101/LO-14 (A1) (CH-1 Alignment)
	CH-2=+8.0±0.1 dBm	⊘ RV201/LO-14 (B1) (CH-2 Alignment)
	CH-3=+8.0±0.1 dBm	⊘ RV301/LO-14 (C1) (CH-3 Alignment)
	CH-4=+8.0±0.1 dBm	⊘ RV401/LO-14 (D1) (CH-4 Alignment)
	MONITOR L=+8.0±0.1 dBm	⊘ RV501/LO-14 (F1) (MONITOR L Alignment)
• Audio Oscillator/Analyzer	MONITOR R=+8.0±0.1 dBm	⊘ RV601/LO-14 (E1) (MONITOR R Alignment)

15-4. AUDIO GAIN CONTROL CIRCUIT UNITY LEVEL ALIGNMENT (AD-73 board)

Conditions for alignment	Specifications	Adjustments
• Connection: Same as Sec. 15-2. • VTR: STOP (EE) • Switch/Jumper setting: Same as Sec.15-2. • Control panel setting: Same as Sec. 15-2.	CH-1; TP-203/AD-73 (B2) 0±4 mVdc	⊘ RV202/AD-73 (B3) (CH-1)
	CH-2; TP-303/AD-73 (E2) 0±4 mVdc	⊘ RV302/AD-73 (D3) (CH-2)
	CH-3; TP-403/AD-73 (H2) 0±4 mVdc	⊘ RV402/AD-73 (G3) (CH-3)
• Oscilloscope 20 mV/DIV 10 µS/DIV	CH-4; TP-503/AD-73 (K2) 0±4 mVdc	⊘ RV502/AD-73 (K3) (CH-4)

15-5. AUDIO A/D CONVERTOR INPUT LEVEL ALIGNMENT (AD-73 board)

Conditions for alignment	Specifications	Adjustments
• Connection: Same as Sec. 15-2. • VTR: STOP (EE) • Input signal (ANALOG AUDIO IN): 1 kHz/+8 dBm • Switch/Jumper setting: Same as Sec. 15-2. • Control panel setting: Same as Sec. 15-2.	ANALOG AUDIO OUTPUT CH-1=+8.0±0.1 dBm	⊘ RV207/AD-73 (B1) (Audio reference level CH-1 Alignment)
	CH-2=+8.0±0.1 dBm	⊘ RV307/AD-73 (E1) (Audio reference level CH-2 Alignment)
	CH-3=+8.0±0.1 dBm	⊘ RV407/AD-73 (G1) (Audio reference level CH-3 Alignment)
• Audio Oscillator/Analyzer	CH-4=+8.0±0.1 dBm	⊘ RV507/AD-73 (K1) (Audio reference level CH-4 Alignment)

15-6. AUDIO LEVELMETER ALIGNMENT (AD-73 board)

NOTE: Alignments for the following Serial No. is not necessary.
DVR-20: S/N 10001 to 10999
DVR-20P:S/N 10001 to 10699
DVR-28: S/N 10001 to 10699
DVR-28P:S/N 10001 to 10599

Conditions for alignment	Specifications	Adjustments
• Connection: Same as Sec. 15-2. • VTR: STOP (EE) • Input signal (ANALOG AUDIO IN): no signal • Switch/Jumper setting: Same as Sec. 15-2. • Control panel setting: Same as Sec. 15-2. AUDIO OUT (DA-1)→UNITY (DA-2)→UNITY (DA-3)→UNITY (DA-4)→UNITY (SCALE)→FINE	AUDIO LEVEL METER CH-1=The scale of audio levelmeter is not indicated. (<–60 dB) CH-2=The scale of audio levelmeter is not indicated. (<–60 dB) CH-3=The scale of audio levelmeter is not indicated. (<–60 dB) CH-4=The scale of audio levelmeter is not indicated. (<–60 dB)	⊘ RV206/AD-73 (D6) ⊘ RV306/AD-73 (F6) ⊘ RV406/AD-73 (J6) ⊘ RV506/AD-73 (L6)

15-7. AUDIO GAIN CONTROL CIRCUIT BALANCE ALIGNMENT (AD-73 board)

Conditions for alignment	Specifications	Adjustments
• Connection: Same as Sec. 15-2. • VTR: STOP (EE) • Input signal (ANALOG AUDIO IN): 1 kHz/+27.5 dBm • Switch/Jumper setting: Same as Sec. 15-2. • Control panel setting: Same as Sec. 15-2. • Set the follwing adjustments to their respective mechanical centers. CH-1; ⊘ RV204/AD-73 (C1) CH-2; ⊘ RV304/AD-73 (E1) CH-3; ⊘ RV404/AD-73 (H1) CH-4; ⊘ RV505/AD-73 (L1) • Audio Oscillator/Analyzer	ANALOG AUDIO OUTPUT CH-1; Distortion=Min (≦0.02%) CH-2; Distortion=Min (≦0.02%) CH-3; Distortion=Min (≦0.02%) CH-4; Distortion=Min (≦0.02%)	⊘ RV205/AD-73 (C2) (CH-1) ⊘ RV305/AD-73 (E2) (CH-2) ⊘ RV405/AD-73 (H2) (CH-3) ⊘ RV505/AD-73 (L2) (CH-4) (VCA THD Alignment)

15-8. AUDIO INPUT CIRCUIT CMRR ALIGNMENT (AD-73 board)

Conditions for alignment	Specifications	Adjustments
STEP 1. • Connection: Same as Sec. 15-2. • VTR: STOP (EE) • Input signal (ANALOG AUDIO IN): 1 kHz/+8 dBm • Switch/Jumper setting: Same as Sec. 15-2. • Control panel setting: Same as Sec. 15-2. • Set an audio oscillator/analyzer to common mode. (If not, disconnect the cold side (Y) of connector and short between the hot side (X) of connector and it.)	ANALOG AUDIO OUTPUT CH-1; Level=Min (≦−50 dB) CH-2; Level=Min (≦−50 dB) CH-3; Level=Min (≦−50 dB) CH-4; Level=Min (≦−50 dB)	⊘ RV201/AD-73 (C1) (CH-1) ⊘ RV301/AD-73 (E1) (CH-2) ⊘ RV401/AD-73 (H1) (CH-3) ⊘ RV501/AD-73 (L1) (CH-4) (COMMON MODE NOISE REJECTION Alignment)
STEP 2. • Input signal (ANALOG AUDIO IN): 1 kHz/+27.5 dBm • Set an audio oscillator/analyzer to differential mode.	ANALOG AUDIO OUTPUT CH-1; Distortion=Min (≦0.02%) CH-2; Distortion=Min (≦0.02%) CH-3; Distortion=Min (≦0.02%) CH-4; Distortion=Min (≦0.02%)	⊘ RV204AD-73 (C1) (CH-1) ⊘ RV304/AD-73 (E1) (CH-2) ⊘ RV404/AD-73 (H1)(CH-3) ⊘ RV504/AD-73 (L1) (CH-4) (VCA THD Alignment)

15-9. AUDIO GAIN CONTROL CIRCUIT MAX LEVEL ALIGNMENT

Conditions for alignment	Specifications	Adjustments
• Connection: Same as Sec. 15-2. • VTR: STOP (EE) • Input signal (ANALOG AUDIO IN): 1 kHz/+8 dBm • Switch/Jumper setting: Same as Sec. 15-2. • Control panel setting AUDIO IN: (DA-1)→ VAR (MAX) (DA-2)→ VAR (MAX) (DA-3)→ VAR (MAX) (DA-4)→ VAR (MAX) Other settings are the same as Sec. 15-2.	ANALOG AUDIO OUTPUT CH-1; Level=20±0.1 dBm CH-2; Level=20±0.1 dBm CH-3; Level=20±0.1 dBm CH-4; Level=20±0.1 dBm	⊘ RV203/AD-73 (B2) (CH-1) ⊘ RV303/AD-73 (E2) (CH-2) ⊘ RV403/AD-73 (G2) (CH-3) ⊘ RV503/AD-73 (K2) (CH-4)

15-3. LINE AMPLIFIER OUTPUT LEVEL ALIGNMENT (LO-14 board)

Conditions for alignment	Specifications	Adjustments
• Connection: Same as Sec. 15-2. • VTR: STOP (EE) • Switch/Jumper setting: Same as Sec. 15-2. • Control panel setting: SET UP/AUDIO IN (DA-1) → INT SG (DA-2) → INT SG (DA-3) → INT SG (DA-4) → INT SG Other settings are same as Sec. 15-2.	ANALOG AUDIO OUTPUT CH-1=+8.0±0.1 dBm	⊘ RV101/LO-14 (A1) (CH-1 Alignment)
	CH-2=+8.0±0.1 dBm	⊘ RV201/LO-14 (B1) (CH-2 Alignment)
	CH-3=+8.0±0.1 dBm	⊘ RV301/LO-14 (C1) (CH-3 Alignment)
	CH-4=+8.0±0.1 dBm	⊘ RV401/LO-14 (D1) (CH-4 Alignment)
	MONITOR L=+8.0±0.1 dBm	⊘ RV501/LO-14 (F1) (MONITOR L Alignment)
• Audio Oscillator/Analyzer	MONITOR R=+8.0±0.1 dBm	⊘ RV601/LO-14 (E1) (MONITOR R Alignment)

15-4. AUDIO GAIN CONTROL CIRCUIT UNITY LEVEL ALIGNMENT (AD-73 board)

Conditions for alignment	Specifications	Adjustments
• Connection: Same as Sec. 15-2. • VTR: STOP (EE) • Switch/Jumper setting: Same as Sec.15-2. • Control panel setting: Same as Sec. 15-2.	CH-1; TP-203/AD-73 (C1) 0±4 mVdc	⊘ RV202/AD-73 (D4) (CH-1)
	CH-2; TP-303/AD-73 (E1) 0±4 mVdc	⊘ RV302/AD-73 (E4) (CH-2)
	CH-3; TP-403/AD-73 (J1) 0±4 mVdc	⊘ RV402/AD-73 (G4) (CH-3)
• Oscilloscope 20 mV/DIV 10 µS/DIV	CH-4; TP-503/AD-73 (M1) 0±4 mVdc	⊘ RV502/AD-73 (G4) (CH-4)

15-5. AUDIO A/D CONVERTOR INPUT LEVEL ALIGNMENT (AD-73 board)

Conditions for alignment	Specifications	Adjustments
• Connection: Same as Sec. 15-2. • VTR: STOP (EE) • Input signal (ANALOG AUDIO IN): 1 kHz/+8 dBm • Switch/Jumper setting: Same as Sec. 15-2. • Control panel setting: Same as Sec. 15-2.	ANALOG AUDIO OUTPUT CH-1=+8.0±0.1 dBm	⊘ RV207/AD-73 (B1) (Audio reference level CH-1 Alignment)
	CH-2=+8.0±0.1 dBm	⊘ RV307/AD-73 (D1) (Audio reference level CH-2 Alignment)
	CH-3=+8.0±0.1 dBm	⊘ RV407/AD-73 (H1) (Audio reference level CH-3 Alignment)
• Audio Oscillator/Analyzer	CH-4=+8.0±0.1 dBm	⊘ RV507/AD-73 (L1) (Audio reference level CH-4 Alignment)

15-6. AUDIO LEVELMETER ALIGNMENT (AD-73 board)

Conditions for alignment	Specifications	Adjustments
STEP 1. • Connection: Same as Sec. 15-2. • VTR: STOP (EE) • Input signal (ANALOG AUDIO IN): no signal • Switch/Jumper setting: Same as Sec. 15-2. • Control panel setting: Same as Sec. 15-2. AUDIO OUT (DA-1)→MAX (DA-2)→MAX (DA-3)→MAX (DA-4)→MAX (SCALE)→FULL	AUDIO LEVEL METER CH-1=The scale of audio levelmeter is not indicated. (<−60 dB) CH-2=The scale of audio levelmeter is not indicated. (<−60 dB) CH-3=The scale of audio levelmeter is not indicated. (<−60 dB) CH-4=The scale of audio levelmeter is not indicated. (<−60 dB)	⊘ RV206/AD-73 (B3) ⊘ RV306/AD-73 (E3) ⊘ RV406/AD-73 (G3) ⊘ RV506/AD-73 (M3)
STEP 2. • Reset the AUDIO OUT setting from MAX to UNITY.		

15-7. AUDIO GAIN CONTROL CIRCUIT BALANCE ALIGNMENT (AD-73 board)

Conditions for alignment	Specifications	Adjustments
• Connection: Same as Sec. 15-2. • VTR: STOP (EE) • Input signal (ANALOG AUDIO IN): 1 kHz/+26.5 dBm • Switch/Jumper setting: Same as Sec. 15-2. • Control panel setting: Same as Sec. 15-2. • Audio Oscillator/Analyzer	ANALOG AUDIO OUTPUT CH-1; Distortion=Min (≦0.04%) CH-2; Distortion=Min (≦0.04%) CH-3; Distortion=Min (≦0.04%) CH-4; Distortion=Min (≦0.04%)	⊘ RV204/AD-73 (C1) (CH-1) ⊘ RV304/AD-73 (F1) (CH-2) ⊘ RV404/AD-73 (K1) (CH-3) ⊘ RV504/AD-73 (M1) (CH-4) (VCA THD Pre Alignment)

15-8. AUDIO INPUT CIRCUIT CMRR ALIGNMENT (AD-73 board)

Conditions for alignment	Specifications	Adjustments
STEP 1. • Connection: Same as Sec. 15-2. • VTR: STOP (EE) • Input signal (ANALOG AUDIO IN): 1 kHz/+8 dBm • Switch/Jumper setting: Same as Sec. 15-2. • Control panel setting: Same as Sec. 15-2. • Set an audio oscillator/analyzer to common mode. (If not, disconnect the cold side (Y) of connector and short between the hot side (X) of connector and it.)	ANALOG AUDIO OUTPUT CH-1; Level=Min (≦−50 dB) CH-2; Level=Min (≦−50 dB) CH-3; Level=Min (≦−50 dB) CH-4; Level=Min (≦−50 dB)	⊘ RV201/AD-73 (B2) (CH-1) ⊘ RV301/AD-73 (E2) (CH-2) ⊘ RV401/AD-73 (J2) (CH-3) ⊘ RV501/AD-73 (M2) (CH-4) (COMMON MODE NOISE REJECTION Alignment)
STEP 2. • Input signal (ANALOG AUDIO IN): 1 kHz/+26.5 dBm • Set an audio oscillator/analyzer to differential mode.	ANALOG AUDIO OUTPUT CH-1; Distortion=Min (≦0.02%) CH-2; Distortion=Min (≦0.02%) CH-3; Distortion=Min (≦0.02%) CH-4; Distortion=Min (≦0.02%)	⊘ RV204AD-73 (C1) (CH-1) ⊘ RV304/AD-73 (F1) (CH-2) ⊘ RV404/AD-73 (K1)(CH-3) ⊘ RV504/AD-73 (M1) (CH-4) (VCA THD Fine Alignment)

15-9. AUDIO GAIN CONTROL CIRCUIT MAX LEVEL ALIGNMENT

Conditions for alignment	Specifications	Adjustments
• Connection: Same as Sec. 15-2. • VTR: STOP (EE) • Input signal (ANALOG AUDIO IN): 1 kHz/+8 dBm • Switch/Jumper setting: Same as Sec. 15-2. • Control panel setting AUDIO IN: (DA-1)→ VAR (MAX) (DA-2)→ VAR (MAX) (DA-3)→ VAR (MAX) (DA-4)→ VAR (MAX) Other settings are the same as Sec. 15-2.	ANALOG AUDIO OUTPUT CH-1; Level=20±0.1 dBm CH-2; Level=20±0.1 dBm CH-3; Level=20±0.1 dBm CH-4; Level=20±0.1 dBm	⊘ RV203/AD-73 (B2) (CH-1) ⊘ RV303/AD-73 (E2) (CH-2) ⊘ RV403/AD-73 (G2) (CH-3) ⊘ RV503/AD-73 (K2) (CH-4)

15-10. AUDIO CROSSTALK CANCEL CIRCUIT ALIGNMENT (AD-73 board)

Conditions for alignment	Specifications	Adjustments
• Connection: Same as Sec. 15-2. • Input signal (ANALOG AUDIO IN): CH-2, CH-4 only 1 kHz/27.5 dBm • Switch/Jumper setting: Same as Sec. 15-2. • Control panel setting: Same as Sec. 15-2. • Audio Oscillator/Analyzer	ANALOG AUDIO OUTPUT CH-1; Level=Min (≦67 dB) CH-3; Level=Min (≦67 dB)	⊘ RV305/AD-73 (B5) (CH-2→ CH-1 CROSSTALK CANCEL Alignment) ⊘ RV505/AD-73 (L5) (CH-4→ CH-3 CROSSTALK CANCEL Alignment)